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Glenrae Machinery Pool A Success

By K. B. ANDERSSEN, Adviser in Agriculture and A. O. EVANS, Dairy Officer.

As in other mixed farming districts of south-eastern Queensland, substantial progress in farm mechanisation has been made in the Central Burnett over the past few years. With the advances in agricultural science and practices, it has become possible to produce substantial quantities of food in various forms with a lower man-hour requirement.

While few will deny the capacity of machines to increase farm production, the cost of this machinery imposes a definite economic limit on the quantity and variety of implements which can be maintained profitably on the average mixed farm.

It has become necessary, therefore, to augment the farm's machinery complement by some means other than purchase. This has been accomplished in some cases by hiring or borrowing the desired implements from neighbouring farms, in others by utilising the services of farm machinery contractors. A third means is the establishment of a farm machinery pool, similar to the venture

Plate 1.

A General View of the Glenrae District, near Mundubbera, where the Machinery Pool Operates.

Plate 2.

The Machinery Pool's Maize Picker being used for Harvesting a Maize Crop.

operated at Glenrae, near Mundubberra, by the Glenrae Machinery Pool Pty. Ltd.

This article is based upon information supplied by the Secretary and members of the above company. The company's operations provide a praiseworthy example, which other farming communities may well emulate.

FORMATION.

In 1949, a group of farmers at Glenrae became imbued with the idea of forming a co-operatively owned machinery pool, following the successful use of a grain header made available on a lease basis. As a consequence, the Glenrae Machinery Pool Pty. Ltd. was formed and registered in 1950 under the Companies Act. A carefully selected set of rules and by-laws was printed for distribution to each member. These have been altered at subsequent general meetings, and may be further adjusted to meet the specific requirements of pool members as the pool expands its scope.

ORGANISATION AND EQUIPMENT.

The Company now has 10 shareholders, whose properties occupy a roughly diamond-shaped area, about 7 miles long by 5 miles wide, served by a central road, with several side roads.

The following is a list of the equipment acquired by the company since its establishment:—

Grain header. Purchased 1948, disposed of 1952.

8 ft. Massey PTO header. Purchased 1949; cost £640.

John Deere pick-up baler. Purchased 1952; cost £1,670.
John Deere side-delivery rake. Purchased 1952; cost £170.
Lang & Walker maize picker. Purchased 1952; cost £722.

It is proposed to acquire additional equipment in the future. It is felt, however, that such items as tractors, saw benches, grain grinders, mowers and cultivation machinery are better owned and maintained by the individual farmer.

The company has a nominal capital of £3,000 and at present the paid-up shares amount to £1,730. A trading bank has extended financial assistance to enable the company to buy the equipment. Each member has access to £3,000 worth of machinery for an investment of £173 paid over several years.

The two most impressive features of this venture are the intelligent and co-operative attitude of the shareholders, and the well drawn rules and by-laws of the company. These have been supplemented at the various Annual General Meetings. It is the careful administration of these rules which has enabled the company to avoid the pitfalls commonly met with in the use of co-operatively owned machinery. The most important rules are summarised below.

RULES.

The machinery is available to members of the Pool only.

The Pool is administered by the Secretary and the elected Directors.

Members place orders for the required machinery by giving the Secretary seven days' notice.

The Secretary arranges an itinerary for each machine, with the object of minimising travelling.

When the equipment is in heavy demand, each member is allowed four days' use of each machine. It is then passed to the next man on the waiting list.

The responsibility for the supervision of servicing and repair of each machine is vested in two members; materials and parts are supplied by the company.

Each machine must be greased and cleaned immediately after the member is finished with it.

When a member is finished with a machine, he hands it over to the next man on the list, or returns it to the company shed for storage, whichever is more appropriate.

A member is required to pay a hiring fee for each machine he uses.

ARBITRATION.

Three arbitrators are appointed to settle any disputes which may arise. Two deputy arbitrators are elected to replace any arbitrator who is himself involved in a dispute or is otherwise unable to act.

The powers of the arbitrators to make decisions are clearly laid down and can be enforced. Disputes are few.

If a member claims that he wants a machine before his turn, he asks for arbitration. The arbitrators will then inspect his crop and those of the other members and give a ruling on the order in which members will have the use of the machine.

An interesting example occurred on one occasion when a wind storm damaged grain crops and, naturally, every member wanted to harvest as soon as possible. The arbitrators inspected every crop and gave a ruling on the order in which members would have the use of the header. They also laid down how many acres each member could harvest before passing the machine on to the next member. After the worst of the damaged grain on each farm was harvested, the members then received the header for the second time, to enable them to complete harvesting.

Plate 3.

The Pool's Header at Work Harvesting a Crop of Grain Sorghum.

Plate 4.

Bagging off the Grain Sorghum Crop on a Shareholder's Farm.

USE AND CHARGES.

During the financial year 1954-55 the following use was made of each machine:—

Header.—310 acres, most of which was sorghum, the remainder being wheat.

Maize Picker.—260 acres of maize. Several members grow very little maize.

Baler.—3,450 bales of hay were baled by various users during the year; mostly lucerne, but a good deal of panicum, millet and Sudan grass.

The fees levied on members for the use of the machinery are compared below with the average charges by local contractors:—

Company.

Header—10s. per acre.

Maize picker—15s. per acre.

Baler and use of side-delivery rake—1s. per bale.

Contractors.

Header—35s. to 40s. per acre.

Maize picker—40s. to 50s. per acre.

Baler and rake—1s 9d. to 2s. per bale.

However, it must be remembered that a contractor provides a man and a tractor, while the Pool only provides the machine. The pool machine is drawn by the member's tractor and all labour is provided by him.

REGISTRATION.

Reference has been made to the advantages of formulating a properly organised company. It may be added that a trade discount can be obtained on some purchases.

The members of Glenrae Pool strongly advise farmers considering the formation of a machinery pool to register as a co-operative rather than a proprietary or limited liability company. In any event, the advice of a solicitor and an income tax agent should be obtained before commencing business. The adjustment of a few legal and taxation technicalities at the commencement of operations can result in substantial savings at a later date.

COMPARISONS.

The advantages and disadvantages of each system of machinery utilisation and ownership must be borne in mind, when contemplating the formation of a machinery pool. It must be remembered that conditions and farming practices vary extensively from district to district, and the individual farmer should weigh carefully the points of each system, which are listed below.

(1) Farmer Ownership.

Advantages.—A machine owned, used and cared for privately usually lasts longer and should give better service.

The machine is always available when it is required.

It can be repaired and overhauled in spare time during the off season.

Disadvantages.—The capital cost is high, especially for a machine which is idle for a large part of the year.

It occupies valuable storage space, or alternatively, it deteriorates because of unsuitable storage conditions.

The owner is often strongly pressed to lend the plant or to do contract work which he does not wish to undertake.

(2) Travelling Contractors.

Advantages.—The farmer is relieved of capital cost and the worries of maintenance, repairs and replacement, and storage of the machine.

The operator is usually an expert, who can make the best use of the machine and the crop.

Plate 5.

The Pool's Hay-baler at Work Baling Pasture Hay to Help Build up Fodder Reserves.

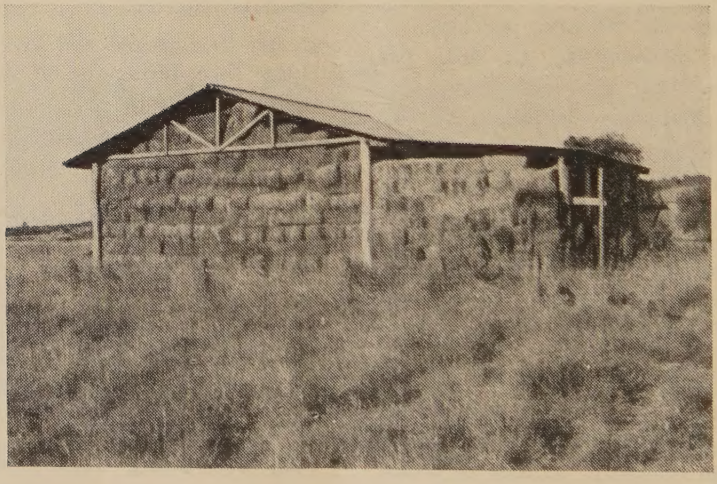


Plate 6.

A Well Stocked Hay Barn on a Shareholder's Farm. This reserve of useful fodder for the drier months was made possible by the Machinery Pool's baling plant.

By serving a large number of farms, the contractor can often provide a wide range of expensive machinery at a highly competitive figure. This is especially so when a new and vastly improved machine comes on the market.

Disadvantages.—At times a contractor, especially if there is no strong competition, can make unreasonable charges. It is often impossible to depend on a contractor to arrive on the due date, or when the crop is ready to harvest.

A contractor with a large capital investment in machinery may at times oppose new methods or new crops.

(3) Machinery Pool.

Advantages.—By spreading the capital cost of the machinery over the shareholders, a wide variety of machinery is available for a relatively modest investment. This applies similarly to costs of repairs and servicing.

The farmers have a direct say in the control and operation of the plant.

The pool sets a standard by which private owners and contractors can be judged.

Disadvantages.—Unless a good set of company rules is laid down and the rules are enforced, maintenance is often neglected.

A Pool may lack the drive and leadership of a successful contractor.

A few members may be called on to do most of the work of organising and running the Pool.

To be successful, a Pool should have a limited membership (6 to 10) situated in a relatively compact area.

CONCLUSIONS.

The record of the Glenrae Machinery Pool has clearly demonstrated its value in increasing the farming efficiency of each pool member, with particular reference to fodder conservation. The effectiveness of this or any similar organisation is governed by the co-operative spirit of each member, and the strict adherence to the rules and regulations laid down at its inception. Last, but not least, it is necessary to select a capable Secretary, who must combine foresight and forcefulness with diplomacy, in order to carry the project through successfully.

CEMENT-COATED BAGS.

In last month's issue appeared an article giving information on the cement-coating of bags. An error occurred in the list of materials required. This should read:—

Cement	12 lb.
Salt	1 lb.
Lime	2 lb.
Alum	½ lb.
Bluestone	4 oz.
Water	1¼ gallons

Making Silage in a Trench

By Officers of the Agriculture Branch.

The trench silo is a good means of providing storage space at small cost. It can be used for storing any type of silage crop. It can generally be dug with farm equipment and does not require any specialised machinery in its making. For these reasons, this type of silo is now most widely used and is recommended.

Filling is easy, as the silage does not have to be elevated. Removal of chopped trench silage can be done with a tractor front-end loader and scoop or a manure loader working from an end face. With small stock numbers it is simple to set up self-feeding arrangements with a hurdle or hurdles suspended from a cross bar across the opened face.

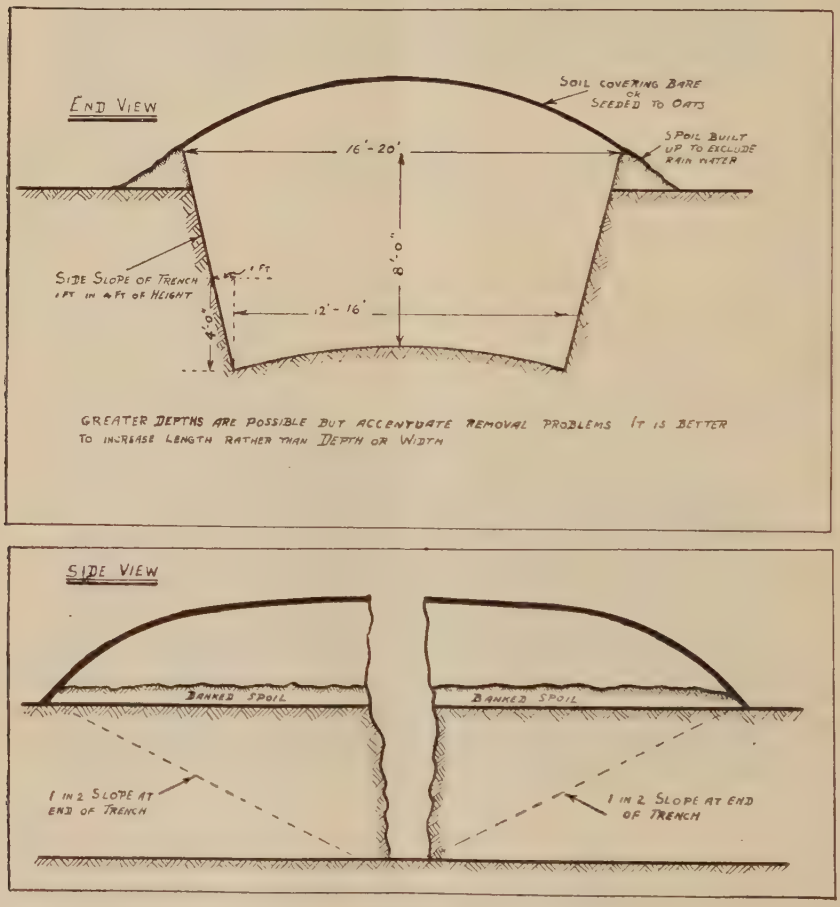

END VIEW
SOIL COVERING BARE OR SEEDED TO OATS
SPOIL BUILT UP TO EXCLUDE RAIN WATER
16'-20'
8'-0"
SIDE SLOPE OF TRENCH 1 FT IN 4 FT OF HEIGHT
1 FT.
12'-16'
4'-0"
GREATER DEPTHS ARE POSSIBLE BUT ACCENTUATE REMOVAL PROBLEMS IT IS BETTER TO INCREASE LENGTH RATHER THAN DEPTH OR WIDTH
SIDE VIEW
BANKED SPOIL
BANKED SPOIL
1 IN 2 SLOPE AT END OF TRENCH
1 IN 2 SLOPE AT END OF TRENCH

Plate 1.

Side and End Views of Trench Silo in Flat Country. Showing higher earth banking to exclude surface water.

Both chopped and unchopped crops can be mechanically handled into trench silos with ease.

Construction.

Trench silos can be built in any convenient situation wherever there is no risk of the silage being water-logged by bad drainage. Some soils are unsuitable for trench silos and will fall in unless reinforced with timber or concrete slab sides. Other soils

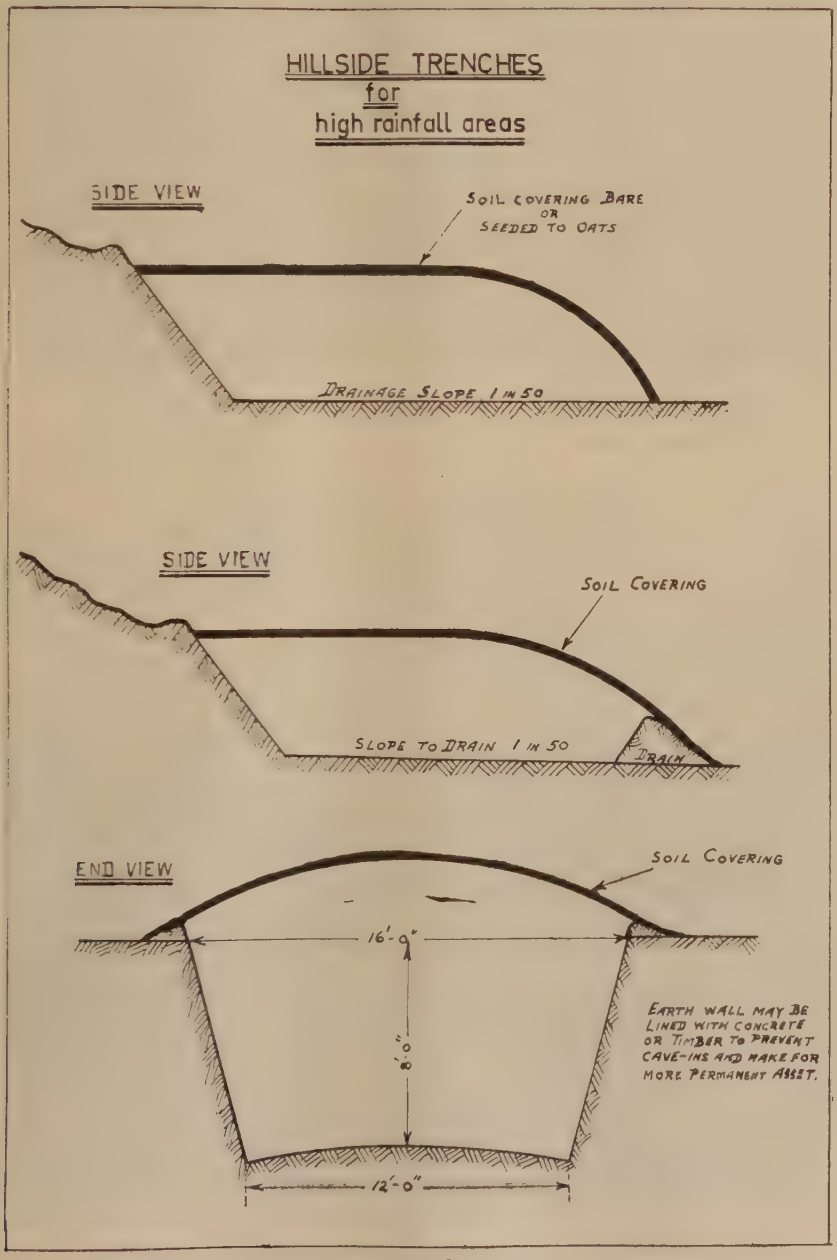


Plate 2.

Sketches of Hillside Trenches for High-rainfall Areas.

with poor drainage are unsuitable unless a hillside site can be found which will give effective drainage.

The protection of trench silage from surface water is most essential in order to prevent deterioration. Surface runoff must be diverted from the silo area (Plate 1). In a hillside silo (Plate 2), the slope of the bottom of the trench will carry away any slight seepage that may occur.

The trench site should be as close to the feeding-out point as possible, though with unchopped crops being handled into the silo trench with a buckrake, the economic maximum haulage distance must be considered. A combination of rear-mounted and front-mounted buckrakes properly operated would extend the maximum economic haulage distance.

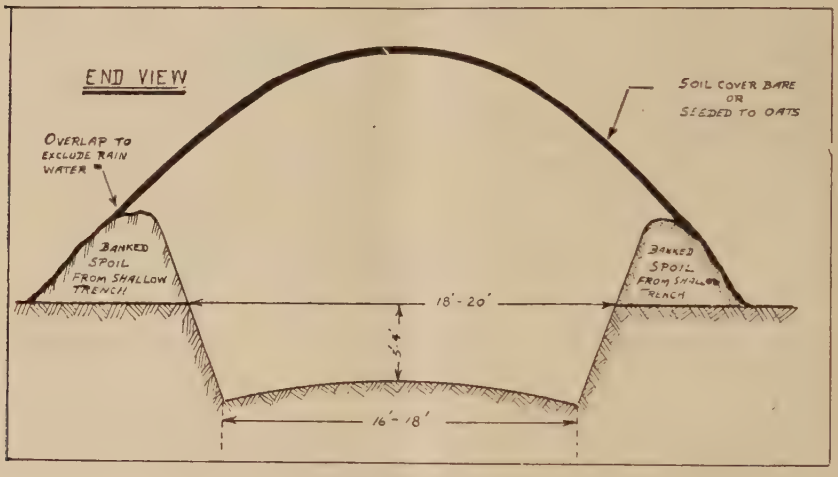


Plate 3.

Combination Trench, Earth Clamp and Stack.

Plate 4.

Side View of a Completed Trench-Clamp-Stack at Chinchilla.

Plate 5.

End View of a Completed Trench-Clamp-Stack.

Plate 6.

Empty Trench Silo, Showing Build-up of Spoil on the Side of the Trench.

Plate 7.
Small Hillside Trench Silo to Hold Nine Tons of Green Crop.

Trenches are commonly dug from 3 to 8 ft. deep, depending on soil type and topography. The spoil from the trench may be used to build the trench up above ground. By this means a part trench, part covered stack can be economically made (Plates 3–5).

Owing to the problems of removal, the depth seldom exceeds 8 ft. in practice and extra capacity is obtained, if required, by increasing the width or the length of the trench. A wide trench may create problems when feeding out, as the exposed face may not be consumed rapidly enough to prevent spoilage. This should be kept in mind when constructing the trench.

The width of a trench silo may be varied considerably according to the method of filling, and the amount of crop to be stored.

For example, if a buckrake load is 9 ft. wide, then a stack or trench would have a width of twice the load width—a single width stack obviously would quickly become dangerous to drive over.

If a trench is being filled by driving through with a truck with an 8 ft. body, then the trench width could be as narrow as 12 ft. or as wide as 20 ft.

If the crop is being dumped over the side, or blown into the trench, the width may vary according to the desired capacity.

The side walls of the trench should slope slightly inwards towards the bottom so that settling of the silage will not produce air pockets at the sides. Silage tends to settle away from vertical walls, leaving air pockets which cause spoilage. The ideal slope is approximately 1 ft. back slope in every 6 ft. of depth. In most soils, a slope of 1 in 4 or 1 in 3 is more practical in order to reduce the risk of the walls caving in.

The trench bottom should be crowned so that it will drain to both sides and should slope towards the lower end with a fall of about 1 ft. in 50 ft. of length.

Both end slopes in a trench silo on flat country may be graded to permit vehicle entry and exit if silage trucks or trailers are hauled through. If side dumping is practised, only one end need be graded for the entry of tractors for compaction of the silage and for the entry of machines for feeding out.

The end slopes commonly used present difficulties in the movement of loaded vehicles from the trench when feeding out. Steep slopes save wastage in the relatively thin layer of silage along the slope.

If steep slopes of about 1 in 3 are used, it is possible to make a more gentle gradient at the emptying end as the silage is being removed.

Where large loads of silage are to be taken from the silo at regular intervals, it is probable that an elevator would be used to carry the silage up to the truck beside the trench.

Generally speaking, end slopes should be less than 1 in 3 for safe operation of wheeled tractors. The softness of the soil on the slope and the loads to be removed determine to a great extent what the slope should be. Softer soil or heavier loads will necessitate more gentle slopes.

TRENCH SIZE.

In calculating the size of trench required, it is usual to allow 56 cubic feet of space for each ton to be stored.

The number of cubic feet per ton of silage varies with the maturity of the crop and the depth of the silo.

Silage packs more heavily into the lower part of a silo than into the upper parts. Thus, as the depth of a silo increases, its capacity increases more than proportionately. An immature crop cut for silage will pack more densely than a more mature crop or a wilted crop. A chopped crop will also settle more completely than an unchopped crop and so will occupy less space for every ton stored.

FILLING THE TRENCH SILO.

Prior to the advent of the forage harvester the crop material was generally put into the trench silo in an unchaffed state. It was cut with a reaper-binder and the bundles hand loaded on to wagons or trucks and loaded off by hand into the trench.

The bundles were laid along the trench in even layers and compacted by driving the trucks, wagons or tractors through the trench as the trench was being filled.

TABLE 1.

TONNAGE CAPACITIES OF TRENCH AND SURFACE SILOS. (BASED ON 56 CUBIC FEET PER TON.)

Width of Silo at Bottom.	Width of Silo at Top.	Depth of Silo at Filling.	Length of Main Section of Silo. (For total length add 32 ft. for 16 ft. slope at each end.)			
			20 ft.	40 ft.	60 ft.	80 ft.
Ft.	Ft.	Ft.	Tons.	Tons.	Tons.	Tons.
12	15	6	52	81	110	139
12	16	8	72	112	152	192
14	17	6	60	93	126	159
14	18	8	82	128	174	220
18	21	6	75	117	159	200
18	22	8	102	160	217	274

Plate 8.

A Buckrake Load of Italian Sweet Sorghum.

Plate 9.

A Buckrake Load of Italian Sweet Sorghum Being Backed Up onto a Stack Silo.

Plate 10.

Buckrakes Bringing in a Ratoon Growth of Sorghum to a Trench Silo.

Plate 11.

Forage Harvester with Cutter Bar Front, and High-sided Truck with Tow Bar Linked to its Steering, Both Drawn by the Tractor from One Common Side-extended Drawbar.

Plate 12.
Tractor, Forage Harvester with Cutter Bar Front, and Trailer Harvesting Italian Sweet Sorghum at Glenmorgan.

There are two more recent methods of filling the trench silo which greatly reduce the labour demand—the use of *mower and buckrake,* and the use of the *forage harvester and crop transport equipment.*

The crop may be mown and then buckraked into the trench (Plates 8–10). It is generally mown in strips which can be raked easily and quickly, so that excessive wilting will not occur. If the crop is not fully mature, of course, some wilting may be desirable.

On a slope the trench is filled from the top end and the loads dropped in pairs across the trench, filling progressing towards the lower end. The loaded tractor can be run in front-end first in the early stages of filling. Backing-on becomes more desirable when the loaded tractor has to climb up on to the fill. Loads can be overlapped more evenly when backed on. Regular packing is necessary. The tractor moving over the fill with each load assists in packing down, and filling is continued until the plant material is high enough to remain above ground level after settling. The practice is to continue filling until the height of the plant material above ground level is equivalent to at least one-third of the depth of the trench, in order to provide for settling.

Often as an economy measure, farmers dig only a shallow trench on a slope or on the level but continue filling till they have a stack 10 ft. or more high. The soil dug out may be little more than sufficient for an effective covering.

Earth scoops attached to tractors are used to place at least a foot of soil over the filled silo to weight it down and to seal off the silage from air and weather.

The second method now in common use employs the forage harvester (Plates 11 and 12), which cuts, chops and blows the crop into a following truck or trailer. As they are filled, the trucks are hauled into the trench or to the trench side and the chopped material dumped into the trench (Plates 13–18). A tractor is used in the trench to pack each load quickly

Plate 13.

Conventional Tip Truck Dumping Chopped Sudan Grass Over the Side of the Trench and Farm Dozer Spreading and Compacting Chopped Crop.

Plate 14.

Conventional Truck Body, with False Floor and Endgate Pulled Off by Cable.

A second cable attached to front of sliding floor prevents it from sliding out any further.

Plate 15.

Jeep Hauling False Floor and Endgate off Truck. Chopped Sudan Grass falling into trench between truck and jeep.

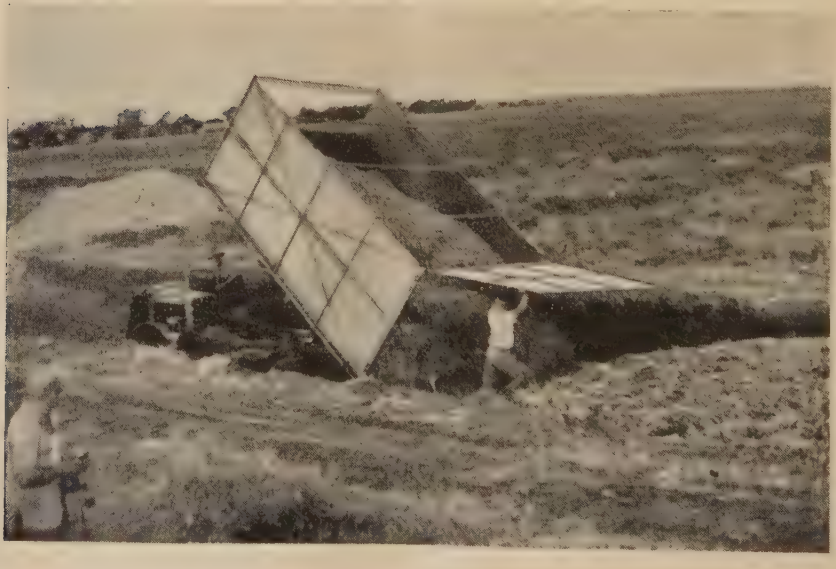


Plate 16.

Tipping a 9-ton Load of Chopped Sweet Sorghum into a Trench Silo at Dundee, North-western Queensland. Rear door must be held clear to prevent it acting as a prop as the body is raised.

to prevent over-heating. Spreading is done by hand or with a farm dozer (Plate 19) or grader (Plate 20).

The ideal temperature to which the crop material should rise is about 100 deg. F. If the material is over-soft and moist, it may be necessary to delay the compressing of the early loads in the trench to ensure that heating does occur.

The chopped material is unloaded into the trench and compressed by regular rolling by the tractor till the fill stands some feet higher than the ground surface.

If there is any doubt about the effectiveness of the packing down, the trench should be added to daily as well as being rolled for some time each day. The fill should be crowned to the centre and when completed covered with at least 12 in. of earth to weight the surface and exclude air. After covering, rolling should continue daily for at least a week to effect an efficient seal.

Regular inspection to correct any cracking that may occur in the soil cover is important. Water or air entering through cracks may cause leaching and spoilage.

EMPTYING THE TRENCH SILO.

It is much simpler to remove chopped silage from a trench than to remove unchopped material.

A tractor scoop or manure rake attached to a tractor front-end loader has been used successfully with chopped silage.

The broadaxe and silage chopper have been used effectively in chopping out long silage. This process can be mechanised successfully by employing a chain saw. A strip is cut off across the trench and then this strip is cut into small sections that can be pushed down off the face and picked up with a tractor scoop.

BALED TRENCH SILAGE.

Some efforts have been made to use this method in the past but the excessive weight of a standard-sized bale of green stuff has been discouraging.

Work in Great Britain in the last five years has suggested a practical method of baling this green material with standard hay-baling equipment slightly modified. Where ration feeding is the rule, it has proved convenient to know exactly how many units of fodder in terms of bales were in store. Weighing out of the bales is not necessary, except for the first few, and so feeding out is speeded up.

The crop is cut with a mower fitted with an inner and an outer swath board. The cut material is thus gathered to the middle into a more compact swath for the baler to pick up.

The baler itself is modified so that it will trip the knotter mechanism twice as often as for hay. The feed auger is also spring-loaded to hold the auger down firmly to give a better grip on the green material. In addition, the bale chamber is fitted with a floor plate 30 in. long to support the crop material and prevent it from sagging while the bale is being formed.

With the machine used in the British tests, it was also found necessary to fit a roller over the lower bale tension spring to prevent the bale movement being obstructed.

In practice, if the crop is mature, it can be baled immediately after mowing. Sufficient wilting must be allowed to occur in less mature crops to prevent wasteful seepage.

Good drainage is most important in the trench, which should have a fall of at least 1 in 50 to the open end.

Plate 17.

Hydraulic Tip Truck with High Sides and Swinging Rear Door.

Plate 18.

A Side-tipping Trailer with Netting and Hessian Sides. Side door propped open as for tipping.

Plate 19.

Using a Farm Dozer to Spread and Compress a Load of Chopped Sudan Grass Dumped Over the Side into the Trench.

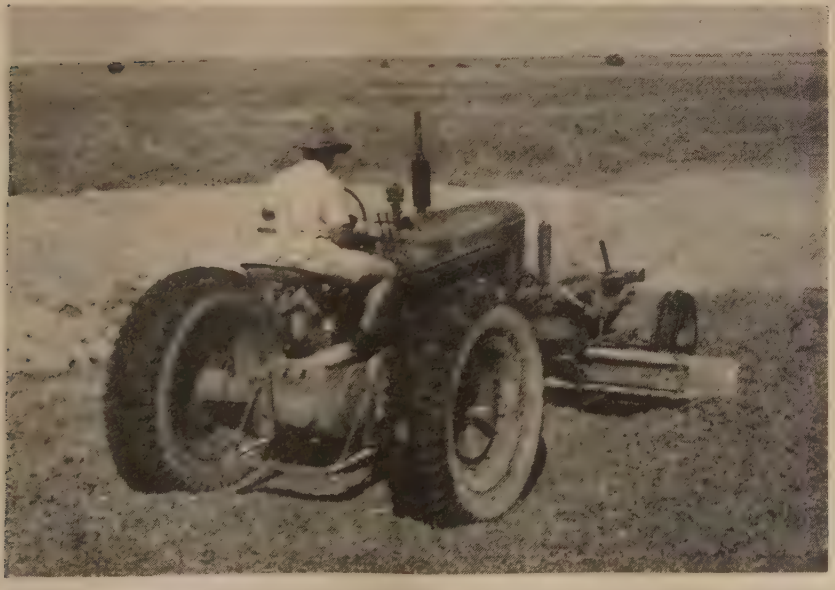


Plate 20.

A Light Grader Being Used to Spread and Compress Chopped Sweet Sorghum.

The bales have to be carefully packed to obtain even settling and ensure the absolute minimum of space between bales. Because of the constant width, but slightly variable length of the bale, it is easier to stack the bales lengthwise with the twines up.

As with all silage, the temperature of the lower layers should reach 100 deg. F. before further layers are added. The more moist the crop is when baled, the slower it is to heat. The bales may be left in the field for some hours, or overnight, to heat before being carted to the trench.

When the bales are being stacked into the trench, they are laid in rows about 6 to 8 bales deep across the whole length of the pit, starting from the deep end.

British experience suggests that it is best to employ two men to do the packing, starting from the sides of the trench and working towards the centre, using the occasional outsize bale to fill the centre space.

Care in packing greatly reduces the need for rolling and lessens the risk of mould or wastage in the stack.

Because of the compression of the material in the bale, regular consolidation of the baled material appears to be unnecessary. Thus it is normal to use the tractor for rolling when the bales have had 24 hours to settle after stacking is completed. The completed stack should be sufficiently high above ground level to shed water, even after settling.

The top is sealed with straw or grass, and covered with about 12 in. of earth.

It has been proved desirable to put some dry hay or straw through the baler to ensure that the baling chamber is left dry after each day's baling. This also helps in forming the first bale on the next day's working.

Shrinkage of baled silage in trenches approximates 15 per cent., compared with the usual 30 per cent. in loose silage.

The usual losses must be expected if the moisture content of the crop is too high. As with other forms of silage, the ideal moisture content is slightly less than 70 per cent.

An interesting and useful aspect of the use of the baler for silage making is that the bale counter accurately records the number of bales made. From known bale weights the total weight of crop ensiled can thus be more easily determined than with other methods.

To what extent baled silage making can be applied in Queensland remains to be seen as there is no local opinion on which to base an opinion. It would appear that the easier removal of baled silage from a silo for feeding out would be offset to a considerable extent by the loss of time involved in picking up bales in the field and placing them in the silo, as compared with chopped silage or buckrake silage making.

POPCORN IS BARRED.

Importation of popcorn and all other maize varieties is prohibited under Commonwealth quarantine regulations, the Chief Plant Quarantine Officer in Queensland (Dr. S. A. Trout) said recently. Gift parcels of popcorn sent to Queenslanders from America and Canada are being destroyed by quarantine officers at the rate of three or four a week.

Importations have been restricted for many years because of the risk of introducing serious diseases which affect maize and which are not present in Australia. If any of these diseases gain a foothold in Australia, they could become a very real threat to Queensland's £2-million a year maize growing industry.

Feeding Hay and Silage To Cattle

By Officers of the Cattle Husbandry Branch.

Ample feed all the year round is the cattle-raiser's ideal. But even if plenty of feed has been put away to supplement pasture and grazing crops, the conserved food must be fed properly if it is going to pay its way.

This article explains how hay and silage can be used to best advantage for dairy and beef herds.

FEEDING HAY.

What is a Good Hay?

A hay to have good nutritive value and to be palatable to all classes of cattle must have certain characteristics irrespective of the crop from which it is made.

It must be leafy.

It must have a green colour.

It must be free from mustiness and mould growth.

It must be free from foreign material such as weeds, stubble, stones and objects such as pieces of baling wire, nails, etc.

It must have stem material that is soft and pliable.

It must have an attractive odour typical of the original crop from which it was made.

These important factors largely determine the quality of any hay from the nutritional standpoint. Therefore, it is essential always to remember that there can be far bigger variations in feed value between different samples of, say, oaten hay than there are between, say, oaten and lucerne hay.

The Place of Hay in Feeding.

Hay is usually described as dry roughage. This often misleads people into thinking that hay is a fodder of relatively low nutritive value and therefore largely of use as a drought maintenance fodder.

In actual fact lucerne hay of good quality, fed at the rate of 20 lb. per day to average dairy cows, will provide more than sufficient energy-forming nutrients for maintenance and much more protein than is required for that purpose. Cereal hays of good quality will provide a similar level of energy-forming foods when fed at the same rate each day, but will be barely adequate, in so far as protein is concerned, for maintenance.

This gives the clue to the type of concentrate supplement that may be required if any degree of hand feeding is contemplated with animals at a high level of production.

Lucerne and other leguminous hays are usually adequately balanced by a concentrate supplement of medium to low protein value, such as a crushed cereal grain. On the other hand, straight grass and cereal hays need a concentrate supplement of high protein value. This is obtained by adding meatmeal, linseed meal or other high-protein fodder in generous proportions to the cereal grains.

Differences in Hay Values.

Lucerne hay and other leguminous hays, such as field pea hay, occupy a place of particular importance in the feeding of cattle. They excel in the following respects:—

(1) They are the richest hays in protein value.

Plate 1.

Selective Feeding by Stock from Grass Hay Stacks Near Winton. The section with a high concentration of button grass is relished and the Flinders grass passed over.

(2) They have a high calcium content. This element is important to young growing cattle and especially to cows that are producing at a high level.

(3) Although not rich in phosphate, they nevertheless have a reasonable level of this essential mineral material.

(4) When well cured, leafy and green in colour they are a good source of vitamins.

Cereal hays, in comparison with the legume hays, have:—

(1) A lower level of protein.

(2) A lower level of calcium.

(3) A similar content of phosphate.

(4) A somewhat lower level of vitamins.

Bush hays made from native grasses such as Mitchell, Flinders and spear grasses are generally somewhat lower again in these food nutrients.

However, as has been mentioned previously, the differences between good and bad batches of the same kind of hay are likely to be as wide as those between hays of uniformly good quality made from different types of forage.

Hay for Dairy Cattle.

Some of the main problems of the dairy industry in the State are associated with and influenced by the following chain of events:—

(*a*) Cows do not make adequate liveweight gains during the dry period between lactations, resulting in

(*b*) a backward condition of these cows at the time of calving. This is often followed by

(*c*) a period of excessive liveweight losses in the early stages of lactation; and

(*d*) an early end of the lactation. This adds to the financial burden of the dairyman because of

(*e*) the extra long period of no profit whilst the cow is dry; and

(*f*) impaired breeding efficiency of the cow as a general result of poor nutrition.

The economic key to such a cycle of catastrophe is a more even plane of nutrition for the cows throughout the year.

The maintenance of a good level of production during the period of the year when the plane of nutrition of animals dependent on native pastures is falling rapidly is an impossibility for even the best cows. The State average lactation production of 150 lb. of butterfat and average lactation length of 220 days are without doubt largely due to nutritional causes.

Hay that is saved from summer surpluses or else made from forage grown specially for the purpose and fed to the herd during the late winter and spring period goes a long way to providing an even and uniform plane of nutrition throughout the year. Milk yields improve considerably as a result.

A daily feeding rate of 10–15 lb. of good quality hay per cow will, under most circumstances, be found adequate.

Feeding Hay to Calves and Growing Stock.

Good hay is an excellent supplement for dairy calves and growing heifers, particularly if made from lucerne or other legume. The vitamin, mineral and protein values of the hay are especially beneficial to these animals.

Dairy calves in most areas of the State suffer a sharp check to their rate of growth following weaning, especially if their only feed is unimproved pasture without a clover or other legume. Lucerne hay is readily consumed by young calves from a self-feeding rack at an early age and can very materially improve growth and development.

Free-choice feeding of calves is generally to be preferred. They are particularly selective in their feeding habits and will generally reject all but the choicest and leafiest portions. The material rejected by the calves can usually be fed with satisfactory results to older animals, especially dry cows.

Good quality cereal and grass hays are of value to growing dairy stock, especially when good pasture is unavailable. Because of their lower protein and calcium value they are inferior to legume hays for calves. If used for young dairy animals they generally need supplementing with a protein-rich concentrate fed at a daily rate of 1–2 lb.

Hay for Beef Cattle.

The pattern of growth of beef cattle throughout most of the State is such that male cattle can be expected to lose weight from June to September. Liveweight gains for about 8 months and liveweight losses for 4 months are repeated regularly each year in most beef producing areas of the State.

The effect of a fluctuating nutritive level that causes such weight changes is older beef at slaughter age.

Hay fed in the period of expected liveweight losses can do much to assist in the maintenance of more uniform liveweight gains.

Male cattle that have ceased to grow and are in the process of fattening can make reasonable gains or at least maintain liveweight on hay supplements even if not of prime quality.

Such cattle do not have large protein and mineral needs. Preliminary trials at the Animal Research Institute suggest that they are capable of maintaining weight on bush hays of comparatively low feed value if salt and bonemeal are added.

To achieve the same effect in the case of growing stock, or in the case of lactating cows, more attention would have to be paid to the protein and mineral intake. Either lucerne or

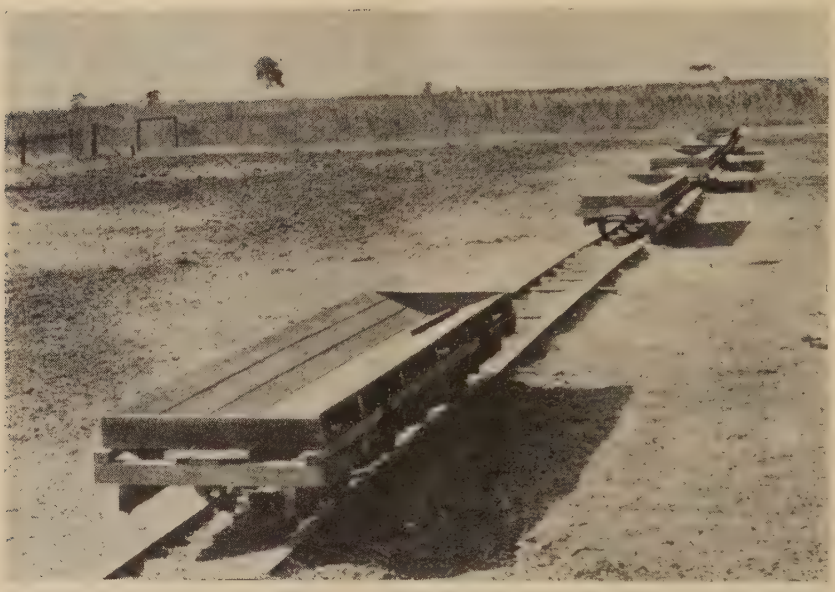


Plate 2.

Trolley Line and Trolleys Used for Feeding Silage to Dairy Cattle.

legume hay or a good quality cereal hay would be needed. A further possibility is to add a protein concentrate such as meatmeal in quantities up to 1 lb. per head per day to the poorer quality grass or bush hay. Bonemeal at the rate of 2 oz. per day would also be beneficial.

Self-feeding of hay under conditions of free range grazing appears to be practicable. If some restriction of the intake is desired, then a maximum daily quantity of 12 lb. per head should meet the needs of livestock in most circumstances.

FEEDING SILAGE.

Silage has not been used by the cattle industries of the State to a great extent in the past, but more and more beef and dairy cattle producers are becoming interested in its production and use.

Special Features of Silage.

Silage has two very desirable qualities that are not possessed by most other roughages, especially those that are dry and mature. It is highly palatable and slightly laxative.

The high palatability of silage, is in many circumstances, extremely important. Cattle will usually eat a greater quantity of roughage each day considered on a dry weight basis (that is, roughage minus its moisture content) when they are fed both silage and dry roughage than when they receive the dry roughage alone. This fact may at times make possible an appreciable saving in concentrates and still maintain production at a satisfactory level.

Silage, particularly that made from maize or sorghum, is slightly laxative. This quality is especially advantageous in the winter and spring period when the usual roughages available, mainly mature pasturage and grass hay, are apt to have a constipating effect and to result in a degree of unthriftiness.

Nutritive Value of Silage.

Because of its bulky nature, silage is classified by feeders as a roughage. If it is made from young foliage of low fibre content, it is in effect a roughage, the nutrients of which are largely diluted by water. This is in sharp contrast to some other roughages, such as the poorer quality hays, chaffs and straws, which have the digestible nutrients diluted by indigestible fibre.

Silage when properly made from pasture or a crop at the correct stage of growth is usually well supplied with vitamins and sufficiently rich in minerals for most purposes. For very young growing animals or high-producing cows, some additional minerals and vitamins are, however, often advantageous.

Silage is also well supplied with the energy-forming food constituents (carbohydrates and fats), but is often not so well supplied with the muscle-building and tissue-building food constituents (proteins).

This protein deficit is particularly marked in silage made from green materials (such as grass and cereals) that contain no legumes, and also in silage made from crop and pastures that are at an advanced stage of maturity.

When made from grasses such as paspalum and kikuyu, silage is generally found to have a protein content below 10 per cent. when calculated on the basis of a sample freed of all its moisture (dry matter basis). However, samples that have been made from young cereals and vetches or from young grass and clover mixtures have, at times, a protein content approaching 15 per cent. This is a level often not exceeded in lucerne chaff.

Feeding Out.

When feeding silage it is important to remove from the silo only sufficient material for one day's feeding. The volatile acids, which give silage its acidy and fruity aroma and have an appreciable energy food value, are lost during periods of excessive exposure. For a similar reason, it is important to disturb the silage mass as little as possible during the feed-out operations.

When self-feeding of the stack or trench by cattle is being practised, considerable wastage may occur unless adequate safeguards are followed. Wastage under these circumstances occurs from:—

(1) Loss of food nutrients in a fashion similar to that described above.

(2) Spoilage of material by fouling and trampling.

The use of electric fences or light wooden baffles placed in such a way across the exposed face of the silage mass that the cattle are forced to eat from the bottom layers is worthwhile. Electric fences are particularly useful in this respect, especially when chopped material is to be self-fed from a trench.

Material that is ensiled in the unchopped or long condition in either an aboveground stack or an underground trench is sometimes more difficult for the animals to remove. This is especially so if the feeding face is smooth, as is the case when the silage is cut out with a hay knife or silo saw. Self-feeding is facilitated in the case of long material when the face is rough.

Hydraulic lifts front-mounted onto a tractor are very useful in removing silage from a trench, especially if the crop has been chopped prior to ensiling.

A buckrake, rear-mounted and hydraulically operated from the tractor, is also useful in removing trench silage. The buckrake can be lowered to the floor of the trench and backed as close as possible to the base of the silage face. The silage can then be broken down from the top of the face onto the tines and removed to the feeding site.

Plate 3.

Dairy Cows Feeding from Trolleys.

Some aboveground wedge-type silage stacks are fed out by the simple process of ripping with a tine implement rear-mounted on a tractor. In this method, wastage is invariably higher than in the more laborious methods; furthermore, the remaining silage is likely to be excessively disturbed and in the event of rain exposed to moisture penetration and hence spoilage.

Refusal is common when silage is first offered to cattle. Many people have been disappointed following their first attempt at silage making to find that their cattle do not readily eat it at first. However, once accustomed to it, they can and will consume large quantities of silage with relish. Even relatively poor samples will be consumed without trouble.

Its high palatability, irrespective of quality, is one of the advantages of silage. Even so, it is not advisable to feed silage that is mouldy, since digestive disorders are at times experienced under such conditions. Mouldy patches in the trench, pit or stack should be rejected by the feeder before feeding. In very many cases the animals themselves will select the better portions and reject the mouldy patches. However, it is best done by the feeder, especially in drought time, when the animals are likely to be on a restricted diet and to be particularly hungry.

Silage for Dairy Cattle.

Silage is most useful as a fodder supplement for dairy cows. This is especially the case when pastures are declining rapidly in nutritive value and becoming unpalatable. This period in most of the State's dairying areas is followed immediately by a period of feed shortage.

Plate 4.

Dairy Cows Eating Silage Spread Along an Electric Fence Line.

The maintenance of a reasonable level of milk production under conditions when the plane of nutrition is falling rapidly is a physiological impossibility for the cows, and for the dairyman who has to go into the fodder market to purchase roughages and concentrates at such a period it is often a definite financial hazard.

In Queensland, the greatest net returns to a dairyman are obtained when there is a year-round abundant supply of good roughage. The economic importance of good hay, silage and pasture to the individual dairyman, as well as to the industry generally, cannot be over-emphasised.

Silage stands supreme as a dairy fodder for cows that are in milk through the winter and spring dry periods because of its succulence and appetite-stimulating properties.

An example of the value of silage as a dry season supplement is the production level of the grade Jersey herd at the Regional Experiment Station at Kairi, near Atherton. This herd of about 40 cows is maintained on pasture (chiefly Rhodes grass and lucerne), occasional forage crops such as oats, and maize silage. Cows in their second and subsequent lactations receive no concentrates at any time. An exception is made in the case of growing calves and heifers which are mated whilst still growing. These receive a maximum of 3 lb. of concentrates per day.

The silage is fed during the dry spring period for about three months each year. The quantity of silage used varies but rarely exceeds 30 lb. per head per day.

The herd production of approximately 240 lb. of butterfat per lactation is nearly double the district average and about 75 lb. in excess of the average production of the recording herds of the district. This improvement is virtually all attributable to the use of silage in generous quantities as pastures deteriorate.

Silage is also an excellent supplement for growing calves. It is especially valuable in the period following weaning, when the growth rate of

large numbers of dairy heifers falls off markedly. Young calves will eat 2–3 lb. of good silage daily from about the second month of life and will gradually increase their daily consumption to about 10 lb. per day at six months of age.

It is generally advisable to feed silage to milking cows just after milking. The flavour of the milk or cream may be affected if fed a short time prior to milking.

Silage for Beef Cattle.

When grazing crops and pastures are virtually unavailable as a result of drought, fire or other hazards, then good sorghum or maize silage will maintain breeding cows in good condition. The quantity needed each day to achieve this will depend on a number of factors, the chief of which are:—

(1) Nutritive value and palatability of the silage.

(2) Size and condition of the cows.

(3) Availability and nutritive value of other grazing.

Generally, 30–40 lb. of silage will be needed for the purpose. If some grazing is still possible, then 20 lb. daily could possibly achieve the same result.

Liveweight losses are normally expected in the winter and spring periods in the State's beef areas. Silage of good quality fed to mature breeding cows at such periods in quantities between 20 and 30 lb. per day should prove adequate to prevent such liveweight losses.

The feeding period in average years does not extend much beyond the four months from June to September, when liveweight losses are to be expected even in the case of adult male cattle.

A rule-of-thumb guide to the quantities of silage needed for cows during the winter and spring periods is half a ton of silage for each cow for every month that feeding is expected to continue.

Silage can be used to produce rapid gains in fattening cattle. In a trial in Tasmania, steers increased in liveweight at rates in excess of 2 lb. per day for a period of about two months when fed 70–80 lb. of good grass-legume silage daily. This silage was the sole feed available to the animals. It had a crude protein content of 18 per cent. on a dry matter basis and had been conserved from ryegrasses and clovers by the use of a buckrake.

Gains of the above order are possible only with outstandingly good silage. However, gains of 1 lb. or more per head per day are quite practicable with average silage if fed at 70–80 lb. per day.

If grazing is available, even though restricted with respect to quality or quantity, then similar gains with smaller quantities of silage would at times be possible.

If very young cattle are to be fattened and silage is to be used as the main and basic ration, it will usually be found that some protein-rich concentrate is essential as a supplement. The quantity needed would be approximately ½ lb. of meatmeal (or its equivalent) per day for supplementing average silage.

Drought Feeding of Beef Cattle.

Silage is unexcelled as a drought fodder for beef cattle because of its palatability and succulence. If properly made from good forage it is rich in minerals and vitamins.

The following daily allowances would be necessary to maintain good health in periods of severe drought. At these times, alternative grazing would be virtually unavailable.

Dairy cows	50 lb. silage
Beef cows	50 lb. silage
Store cattle	40 lb. silage

Lesser quantities will maintain life during prolonged drought, even though health deteriorates.

Naming Pesticides

By W. R. WINKS, Senior Chemist.

Prior to the second world war most of the pesticides used in the agricultural and pastoral industries were of inorganic origin—that is, they were derived from common minerals and ores. Lead arsenate, arsenical dipping fluids, lime sulphur, Bordeaux and Burgundy mixtures are some examples of inorganic pesticides. The main exceptions to the above generalisation were pyrethrum and derris with their active principles, and some organic mercurials used as fungicides.

Organic substances are substances which always contain carbon in their molecule and were originally derived from plant or animal material.

Jungle warfare and contact of armies with civil populations brought a real threat of insect-borne diseases to the armies and to combat this threat a steady stream of pesticides, beginning with DDT (dichlorodiphenyltrichlorethane) and swelling to a flood of organic preparations, was evolved. These substances had long and involved chemical names such as the one given above to the substance known as DDT.

It soon became necessary for these complex organic chemicals to be given names for everyday use, and so we find the chemical names being shortened to the initials of essential portions of the molecule or to numerals and letters indicating the position of certain elements or groups of elements in the chemical structure.

Thus we have BHC, an abbreviation for the chemical benzene hexachloride, and 2,4-D, an abbreviation for the chemical 2,4-dichlorophenoxyacetic acid. The figures 2,4 indicate to the chemist the position of the chlorine atom in the molecular structure of the chemical. The letter D is an abbreviation for dichlorophenoxyacetic acid.

Many of the manufacturers gave to their products their own trade names and in some cases these trade names have become the common names of such chemicals. Examples are dieldrin and endrin.

There is also a system of nomenclature composed of letters and figures used by research workers in the laboratory to indicate preparations discovered by them before such substances were released for general use—for example, E605 and 1080.

The laboratory system of naming chemicals has been used by advertisers to imply that their products contain substances not available to anyone but themselves and possess some mystic properties. One often hears over the radio that a certain "Cleanums tooth paste" contains PZ112 which gives it cleansing properties superior to those of its competitors.

To complicate matters still further, we have what are known as isomers of chemical substances. These isomers are substances with exactly the same chemical composition but with a different molecular structure—that is, the same kinds of bricks have been used to build different houses. Some of the possible isomers have little or no pesticidal activity, while others are effective in small quantities.

Everyone is familiar with the label indicating that the article in question contains x per cent. of the para para isomer of dichlorodiphenylthrichlorethane or y per cent. of the gamma isomer of benzene hexachloride. The term para para indicates to the chemist the position of the chlorine atom in the molecule of DDT, while the term gamma indicates the configuration of the complete molecule of BHC. We then speak of the substances as *p'p'*DDT and gamma BHC respectively.

In the manufacture of many chemicals the combination of substances gives rise to a number of mixed isomers. It is sometimes practicable to separate the active isomer from the inactive ones, but mostly the impure substance is used and the formulation is compounded to contain a definite amount of the active isomer. Thus a formulation containing 20 per cent. of commercial BHC would contain 2.6 per cent. of the gamma isomer of BHC. Commercial BHC contains 12-15 per cent. of the active gamma isomer. Lindane and Isogam are trade names for almost pure gamma BHC.

So you will see that the system of naming agricultural chemicals has been devised to give a simple, easily remembered name to complex chemical substances and not to imply mysterious properties which the substances do not possess.

NO BACKING FOR ONCE-A-DAY MILKING.

Dairy farmers can expect no relief from their recurring task of milking twice a day. The Minister for Agriculture and Stock (Hon. O. O. Madsen, M.L.A.) said tests have clearly shown that once-a-day milking is uneconomic and has no permanent place in the dairy industry.

Reckoned in terms of milk production, the practice is little short of disastrous, reducing yields by up to 30 per cent. and even more. At the best, once-a-day milking is only a short-term stop-gap arrangement that frees labour and resources for further development on the farm.

Mr. Madsen said that prominence has recently been given to claims of one or two dairy farmers who regularly milk their cows once a day. These claims, however, are not supported by the results of tests at the Department's Biloela Regional Experiment Station.

The effect on production of once-a-day and twice-a-day milking was compared in four trials at the Station. Cows being milked twice a day were switched to once-a-day milking, and cows being milked once a day were changed to twice-a-day milking.

In every case, production was higher when the cows were milked twice a day. Even when the cows were beginning to dry off and were giving less than a gallon a day, yields were higher with twice-a-day milking. Generally, the loss in production through once-a-day milking was in the region of 25 to 30 per cent., but sometimes it was slightly higher.

Under some special circumstances, the income from once-a-day milking could be slightly higher than from milking twice a day. There could be bigger sales of dairy cattle for beef, lower detergent and machine cleaning costs, lower power costs for operating machines and so on.

It is not considered to be in the best interests of the dairy industry to milk herds once a day at a low level of production. Rather, the Department's recommendations aim at raising the production of each animal or of each acre. This creates conditions that make twice-a-day milking a necessity.

Closer Spacing of Pineapples

By R. C. CANNON, Senior Horticulturist.

Recent experiments in pineapples at the Maroochy Experiment Station have opened up the prospect of increased yields per acre by the adoption of closer spacing in the row. A reduction in the distance between plants in the row from the standard 12 in. to 9 in. increased the plant crop from 22.3 tons per acre to 29 tons per acre.

For many years, the established practice in Queensland has been to set the plants 12 in. apart in double rows spaced 6 ft. centre to centre with approximately 14,000 plants per acre. The main advantages of this layout are ease of cultivation and harvesting, and the elimination of undue competition between the plants for available nutrients and the moisture in the soil. This system of planting has proved reasonably satisfactory under a wide range of soil and climatic conditions.

Plate 1.

Young Pineapples Planted at Standard Spacings. These are 12 in. between plants, 2 ft. between rows, and 6 ft. between paired rows (centre to centre).

Plate 2.

Ratoon Pineapples. The fruit topples over and is subject to sunburn when row spacings are less than 2 ft.

Double-Row Spacing.

In Hawaii, the spacing of the double rows in pineapple plantations has been reduced to 5½ ft. centre to centre, with a corresponding increase in the number of plants per acre. Under the climatic conditions of that area and the methods of crop management employed, the closer spacing does not interfere with cultural or harvesting operations.

In Queensland, where plantations may be carried into the second or even later ratoons, the wider double-row spacing of 6 ft. centre to centre is frequently necessary for ease of handling the ratoon crops.

In recent years, however, there has been an increasing tendency to limit the life of the plantation to 3½ years, during which period a plant crop and one ratoon crop are harvested. In addition, the control of cropping which is now achieved by planting graded material and the use of hormones for flower induction has, to a large extent, eliminated from commercial plantations overgrown or "hold-over" plants which occupy a considerable amount of ground space.

Both of these developments suggest that a closer spacing might soon become normal practice in Queensland. Quite apart from the increased yields per acre which could be expected in an average season, closer spacing would be an advantage from the point of view of weed control; the greater shading of the soil between the rows tends to suppress weed growth early in the growing period.

Inter-row drains, which are needed in many areas to cope with surface water during wet weather, influence row spacing and also the width of the beds carrying a double row of plants. A narrow bed, although providing free

drainage during the wet season, may lose excessive amounts of soil moisture by evaporation from the surface in dry weather such as is commonly experienced in spring and early summer.

This consideration is probably sufficient justification for retaining the 6 ft. centre to centre, double-row spacing at present followed by the majority of growers. Nevertheless, $5\frac{1}{2}$ ft. double-row spacings, centre to centre, are frequently used on replant land where plant size is not large and the surface gradient is not excessive.

Plate 3.

Extreme Multiple-topped Pineapple Fruit. The industry prefers a medium-sized fruit (3-4 lb.) with a single small top. Large multiple-topped fruit is sometimes a problem in the wider spaced plantings, particularly in "holdover" crops after a favourable growing season.

Spacing of Plants in the Row.

The distance apart of the two rows in the bed has been standardised at 2 ft. for many years. Closer spacings between rows have seldom proved satisfactory; the plants are somewhat crowded and there is a tendency for the fruit in the ratoon crops to topple over and become damaged by sunburn or even to break away from the plant altogether.

It has been generally accepted in Queensland that the best distance between plants in the row is 12 in. In Hawaii, however, closer spacing in the row is said to reduce the incidence of multiple topping, which is troublesome in certain seasons. This same phenomenon of multiple topping is fairly common in Queensland following unusually favourable growing conditions. The affected fruit is virtually unsaleable on the fresh fruit market and trimming away the tops before despatch to the cannery is a tiresome business.

Plant spacing in the row has therefore been investigated, partly to determine its effect on yield, but also to assess its value as a method of reducing multiple topping in the plantation.

Recent Trials.

Plant spacings in the row were investigated at the Maroochy Experiment Station in a replicated trial established during autumn, 1953. The

trial was designed to compare spacings ranging from 12 in. between plants down to 9 in. between plants. The distances between rows (2 ft.) and between paired rows (6 ft. centre to centre) were standard in all plots. Fertilizer was used at the standard rate per 1,000 plants, the amount per acre being proportionately greater for the closer spacings.

Crop growth was very good early in the cropping cycle but the closer spacings tended to force the plants into a somewhat erect habit of growth, as a result of which they appeared larger than plants at the wider spacings, though they were, in fact, only taller.

In the plant crop, which was harvested in 1955, fruit size (3-3½ lb.) was uniform in all plant spacings—that is, close spacing in the row did not produce any reduction in size. Yields were thus directly proportional to the number of fruit harvested, which is governed by the number of plants per acre. The yields obtained from the plant crop are shown in Table 1.

Yields increased progressively with reduction in spacing from 12 in. to 9 in. between plants, the maximum increase being 6.7 tons per acre.

TABLE 1.

Effect of Plant Spacing in the Row on Pineapple Yield.

Spacing.	Plants per Acre.	Average Fruit Weight.	Yield per Acre, "Tops Off."
in.		lb. oz.	tons.
9	18,666	3 8	29·0
10	16,800	3 7	25·8
11	15,272	3 8	23·9
12	14,000	3 9	22·3

Suckering in the plant crop was uniform at all spacings and there was every indication at this stage that the ratoon crop would follow the pattern of the plant crop. Unfortunately, extremely dry weather in spring and summer, 1955, adversely affected plant development and the fruit did not mature to commercial sizes. No differences were apparent between plots with different plant spacings in the row.

The evidence to date therefore indicates that, in normal seasons, close spacing in the row is desirable. A precise measure of its effect on yields in the ratoon crop is, however, still needed.

GYMPIE ARRANGES A FARMERS' SCHOOL.

Townspeople of Gympie are sponsoring a week's school on fodder conservation for young farmers and graziers in their district. It will be held in Gympie from December 2 to December 6.

The Minister for Agriculture and Stock (Hon. O. O. Madsen, M.L.A.) said Gympie is the first Queensland city to arrange a school to teach farmers and graziers more about their industries. It indicates the awareness of the residents that the advancement of their city depends in a large measure on the prosperity of the rural community.

Dry seasons like this one demonstrate only too clearly the need for a planned fodder conservation programme on every property. Although statistics show a steady increase in the amount of fodder being stored, the total is still very small in comparison with the needs of the State's livestock. Scientific studies have evolved improved methods of producing good crops on limited rainfall and of making the most effective use of irrigation. The Department encourages fodder conservation and its advisory officers are available to help interested landholders.

The Department is giving full support to the school and senior officers will discuss planned farming, crops and pastures, conservation methods, the food value of fodders, and irrigated pastures. Gympie district farmers will speak on practical dam building and irrigation and there will be practical demonstrations of hay making, silage making and tractor maintenance.

Mr. Madsen added: "It's something new in Queensland for a city to sponsor a school, and Gympie is to be congratulated on its initiative."

Stringless French Beans

By H. M. GROSZMANN, Senior Plant Breeder, Horticulture Branch.

Queensland produces over 15,000,000 lb. of French beans per year—and they all have to be stringed. According to a firm that prepackages beans, stringing costs about 6d. per lb. Admittedly, most bean stringing is done by the housewife, but it still requires the same amount of effort—about £300,000 worth. Added to this waste of energy, there is a serious wastage of beans, for stringing removes part of the flesh of the pod. Every year in Queensland at least £50,000 worth of beans are grown, picked, packed and transported hundreds of miles only to be thrown away as waste with the string.

Limitation of the String Bean.

In their eating habits, people are largely slaves of custom. In our use of string beans we have adopted the ways of the people in the British Isles, where such beans are picked at a young and tender stage, just when they have reached their full length and before the seed has grown to any size. At this stage, the amount of string is negligible and the fibre has not yet become coarse in the walls of the pod.

Unfortunately, few Queensland beans reach the market in this condition and for several good reasons. To begin with, this stage lasts only a short time—less than 2 days—for, once the pod has reached its greatest length, rapid changes begin.

If picked earlier, there is considerable loss of weight both at harvest and from wilting during transport. If picked later, which is more common, the seed has begun to grow, the string is quite obvious and fibre is developing in the walls of the pod. To make matters worse, these processes go on during transport and storage until the string is tough and the wall fibre is nearly as impressive.

Because of the labour entailed in picking, it is not practicable to pick the crop every second day in order to pack the perfect bean. Further, our considerable distance from southern markets involves so much loss of time in transport that a bean is not the same when it reaches the market as it was when packed. More rapid transport and possibly cold storage could help greatly, but the requisite facilities are not available at present, or only at high cost.

The Alternative.

The alternative is a bean which does not deteriorate too rapidly with age and does not develop excessive string or wall fibre. Such beans do exist. Not only do they exist, but they form the basis of a 40,000,000 bushel industry in the United States of America. There, the bulk of the green beans grown for market are stringless. The development of such beans made possible a great canning and prepackaging industry and an even larger fresh bean industry. This change to stringless beans has taken place in less than 50 years.

Canning and prepackaging industries cannot afford to handle string beans. Apparently, our household economy can. In recent years, however, the demand by the Australian home gardener for seed of stringless varieties has been increasing rapidly. This will inevitably lead to a demand for such beans on the market. When that time comes, the commercial grower will need stringless varieties that he can market at a profit—varieties that yield well and carry well.

Plate 1.

Varieties of French Bean. Top to bottom—Brown Beauty, New Beauty, Hawkesbury Wonder, Richmond Wonder and Florida Belle. Florida Belle, a stringless type, is being used in the breeding programme for a stringless bean suited to Queensland conditions.

The Solution.

It might reasonably be expected that the leading American varieties of stringless bean would meet our requirements; but they don't. Several of them have been imported and tested under Queensland conditions, but they could not compete in yield and pod quality with our leading string variety, Brown Beauty. For that matter neither can other string varieties; Brown Beauty has led the field against numerous competitors for many years.

Plate 2.

French Bean Testing Block. Strain selection and purification is carried out at the Redlands Experiment Station in plots of this kind.

The solution appears to lie in breeding for Queensland conditions a stringless bean with the productivity of the leading string varieties. This should not be too difficult.

Stringlessness is inherited in a simple fashion and it should be possible to get a stringless variety otherwise much like the best string types, simply by crossing a stringless variety with a standard string variety and repeatedly crossing the stringless progeny back to the standard. It is also fortunate that string and wall fibre are inherited independently and that wall fibre appears to exists in varying degrees in the available parental material. This should permit us to breed a stringless variety with the moderate amount of wall fibre which is desirable to maintain pod quality during transport and storage.

Wall fibre is also desirable in stringless varieties in order to permit commercial production of seed for the green bean industry. A pod with too little fibre breaks very easily when dry and is difficult to thresh. No matter how good a bean may be in other respects, it has no commercial future if seed cannot be produced profitably.

Breeding for Stringlessness.

Breeding to produce a good stringless bean for Queensland conditions is already under way and some of the material is now in its eighth hybrid generation. A number of the selections are high-yielding types but the pods show rather too much curling and are not as straight as the best string

selections from the same cross. In some ways, the presence of string appears to go with straighter pods and we have still to isolate a high-producing, straight-podded stringless type. However, results to date are sufficiently promising to warrant an extension of the work. A wide range of crosses is planned and many new hybrids are under observation.

The aim is not just to produce a good stringless variety. The variety sought must be as productive as the best string varieties throughout the season, and particularly in the colder winter months when yield and quality in southern Queensland crops are generally very poor—and the price very good. Even the best string varieties are found wanting at this time of the year.

In general, a commercial bean variety must both stand up to growing conditions and meet market requirements. Unfortunately, many of the factors which make a variety or strain valuable are not known and cannot be foreseen. This is well illustrated by some experience in the work that has been done so far.

When the second hybrid progenies were raised, it was found that many selections suffered severely from root and stem rot. This is not a common fault in our better known varieties and was not an anticipated hazard in the breeding programme. However, once standard varieties were abandoned it became a real risk.

However, one factor of importance—resistance to wind damage—was recognised. Fortunately, the stringless parent, Florida Belle, had a very strong stem, and it passed this characteristic on to the hybrids. When severe winds occurred, the plants stood up well; in fact, they were so rigid and unyielding that their leaves blew off. On the other hand, straggling plants with weaker stems blew over more, but held their foliage much better.

In view of the many unknown factors in the constitution of the bean plant and their importance in a breeding programme, it is necessary to use a wide range of parental varieties and to continue breeding and testing for several seasons before new varieties are released. Even then, it is likely that in the more extensive tests imposed by commercial production, some promising varieties will fail. Nevertheless, one really superior variety more than compensates for the work.

An increase in yield of 5 per cent., or 1d. a pound premium for quality beans, means over £50,000 per annum more in the pockets of Queensland bean growers.

GOOD PRODUCTION.

What a great cow "Sunny View Little Princess 20th" is! This animal, owned by Messrs. J. Phillips & Sons, "Sunny View," Kingaroy, already holds the production record for the Junior 2 and Junior 3 ages class for A.I.S. cows.

Her production records are:—

	Calved.	Milk. lb.	Test. Per cent.	Butterfat lb.
J2	.. 2-8-55	13,122	5.0	651
J3	.. 22-7-56	18,606	4.5	840

This cow calved again on July 20, 1957.

At the recent Royal National Association Show she won the Ground Milking Competition with an average daily production of 89.6 lb. milk and 3.74 lb. butterfat. She was again tested on September 3, when she produced 109.3 lb. milk and 4.48 lb. butterfat. She has thus joined a small select band of cows which have produced over 10 gallons of milk per day.

Processing Cream for Buttermaking

By W. D. MITCHELL, Dairy Technologist.

The manufacture of high quality butter is important to the dairying industry of Queensland. Each year some 40,000-50,000 tons of butter are produced and of this approximately 40 per cent. is of choice grade quality.

High quality ensures continued consumer demand both locally and on overseas markets, and in view of the serious competition which faces butter sales, the factors which affect quality demand consideration by all branches of the dairying industry.

In the 1956-57 production year Queensland butter factories manufactured 41,089 tons of butter. This represents approximately 25 million gallons of cream. It was processed in 51 butter factories distributed throughout the dairying districts of the State.

In general terms the quality of this butter was determined by two factors:—

(1) The quality of the cream supplied by producers.

(2) The grading and processing operations performed within the factories.

What is Processing?

On receival at the factory, cream is graded into choice, first, and second grades. The producer is paid according to this grade at a predetermined rate.

The next stage of operations is to treat this cream to ensure that the butter made from it has a long enough storage life. On occasions it is necessary to hold butter in cold storage for periods up to 8 months before consumption and therefore treatment must be adequate to meet these stringent conditions. This treatment entails neutralisation with alkali (carbonates and bicarbonates) to reduce the acidity of the cream, and heat processing.

Heat processing is done in machines specially designed for this purpose. The treatment includes three separate stages:—

(1) The completion of the neutralisation process by the removal of all gases formed from the action of the neutraliser and the acid cream.

(2) The pasteurisation of the cream at a high temperature and for a sufficient time. Temperatures range from 180 to 210 deg. F. and may be applied for 5-18 seconds while the cream passes through the machine. Efficient heat treatment can reduce the bacterial population from 600 million per c.c. to less than 50,000 bacteria per c.c. in this short time (a c.c. is about 10 drops).

(3) Some form of deodorisation. In this operation cream is boiled under vacuum conditions in the presence of an excessive flow of live steam. Certain undesirable flavours boil off, and the steam washes them away in the same way as air circulation removes paint fumes from a room.

Types of Machines.

In Queensland factories two types of processing machines for treating cream have been in use. These are the flash pasteurisation unit, and the vacuum processing unit. Today the majority of factories have vacuum operated units.

A typical flash pasteuriser, as illustrated in Plate 1, consists of two domes. The inner dome is fixed to the frame leg and is heated internally with live steam and condensate. The outer dome is removable and rests over the inner dome. Cream is pumped up between the two domes and heated to the desired pasteurising temperature. It then falls down the outside surfaces of the outer dome into the tray and is pumped away to the coolers.

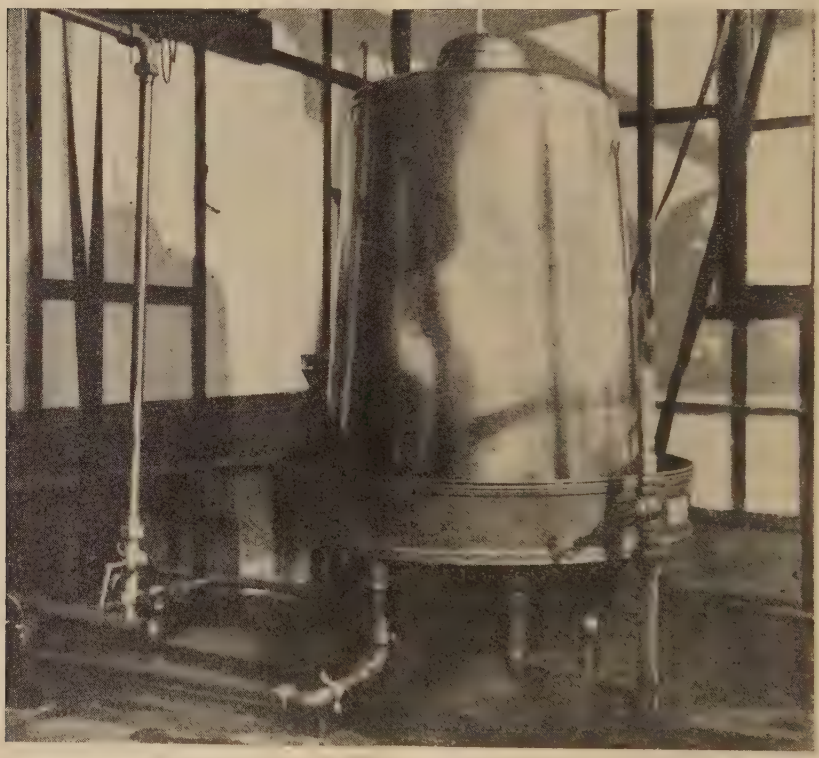


Plate 1.

Flash Pasteuriser.

There are three types of vacuum processing units in use—the Murray Vacreator, the A.P.V. Cream Treatment Unit, and the Bell Volatiliser. Illustrations of these machines are shown in Plates 2, 3 and 4 respectively.

The Murray Vacreator consists of a series of stainless-steel chambers into which cream is sprayed. Here it comes into direct contact with live steam. Steam and cream flow from chamber (leg) to chamber (leg) in the same direction (concurrent flow). With the manipulation of special valves the vacuum conditions are varied within the chambers to draw the cream through the machine. Special water ejector condensors induce the vacuum conditions and remove volatile off-flavours and steam. Cream can be processed at a rate of 250-1,100 gal. per hour.

A special adaptation known as the "Steam Stitcher" can be added to the Triple Unit Vacreator to achieve steam economy during processing.

The A.P.V. Cream Treatment Unit also consists of a series of steel chambers into which cream is sprayed along with live steam. In this unit,

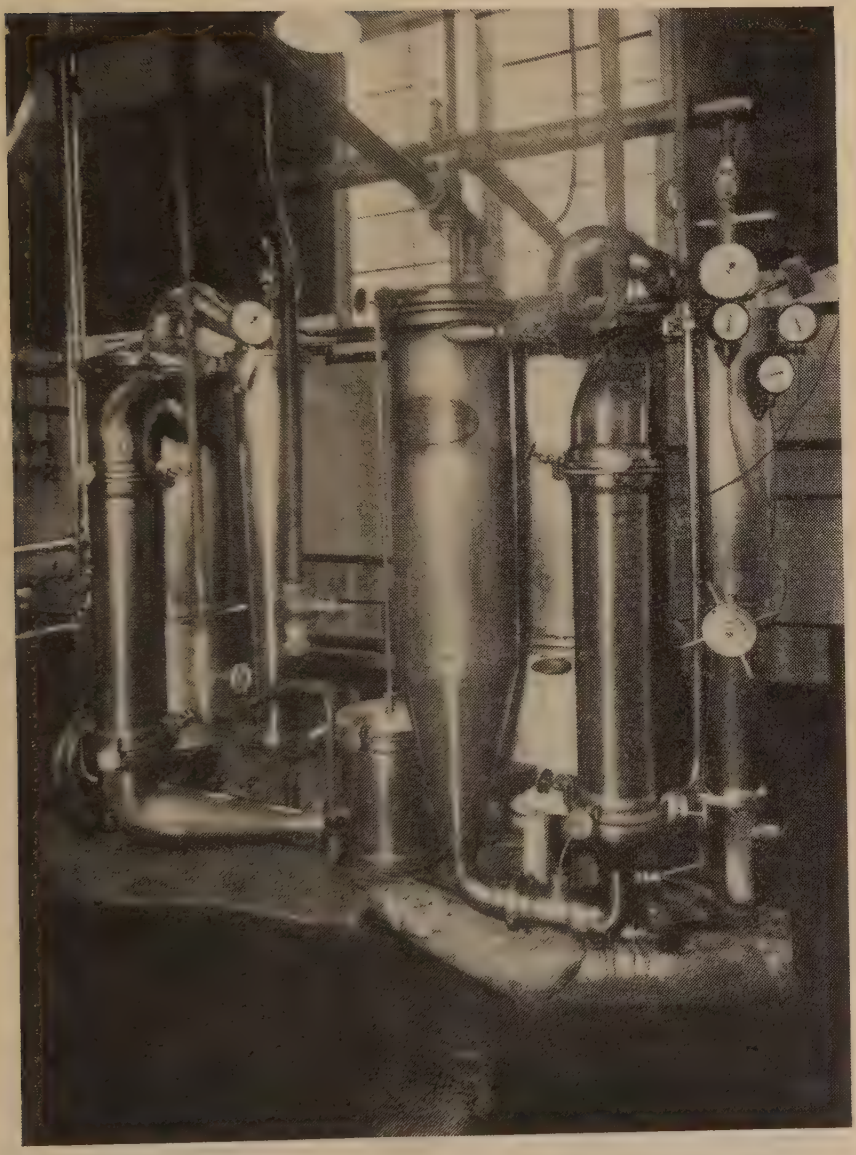


Plate 2.

Murray Vacreator—Tandem Unit.

however, cream and steam flow in opposite directions (counter-current flow). This ensures very effective removal of off-flavours. Other differences in operation are the pumping of cream from chamber to chamber and the by-passing of cream through a plate heat exchanger for heat economy. Also, only one condensor is used to apply vacuum conditions. Cream can be processed at rates from 200-2,000 gal. per hour.

The Bell Volatiliser consists of two chambers—a pasteurisation unit and a deodorisation section. Cream is heated

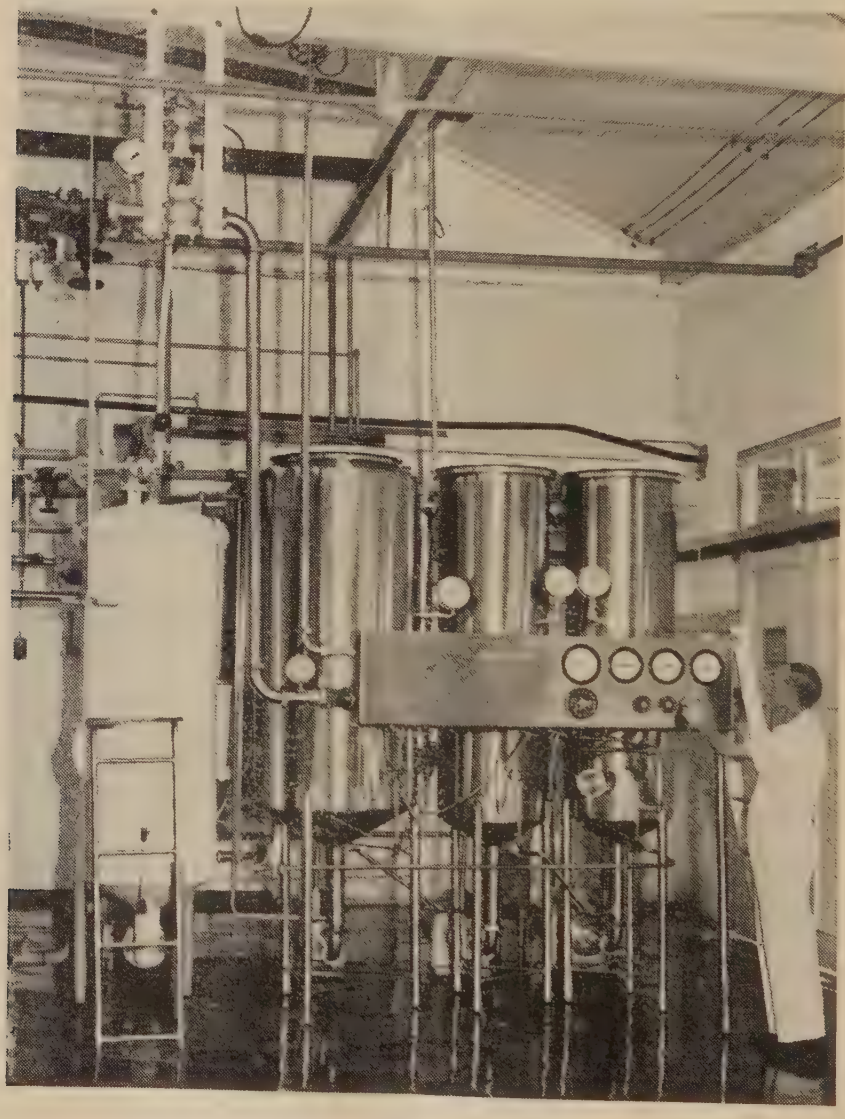


Plate 3.

A.P.V. Cream Treatment Unit.

by injecting live steam into the cream as it falls in a thin film across a series of horizontal plates. It is then drawn into the second section, where vacuum deodorisation proceeds. Cream can be treated at rates of 600-800 gal. per hour.

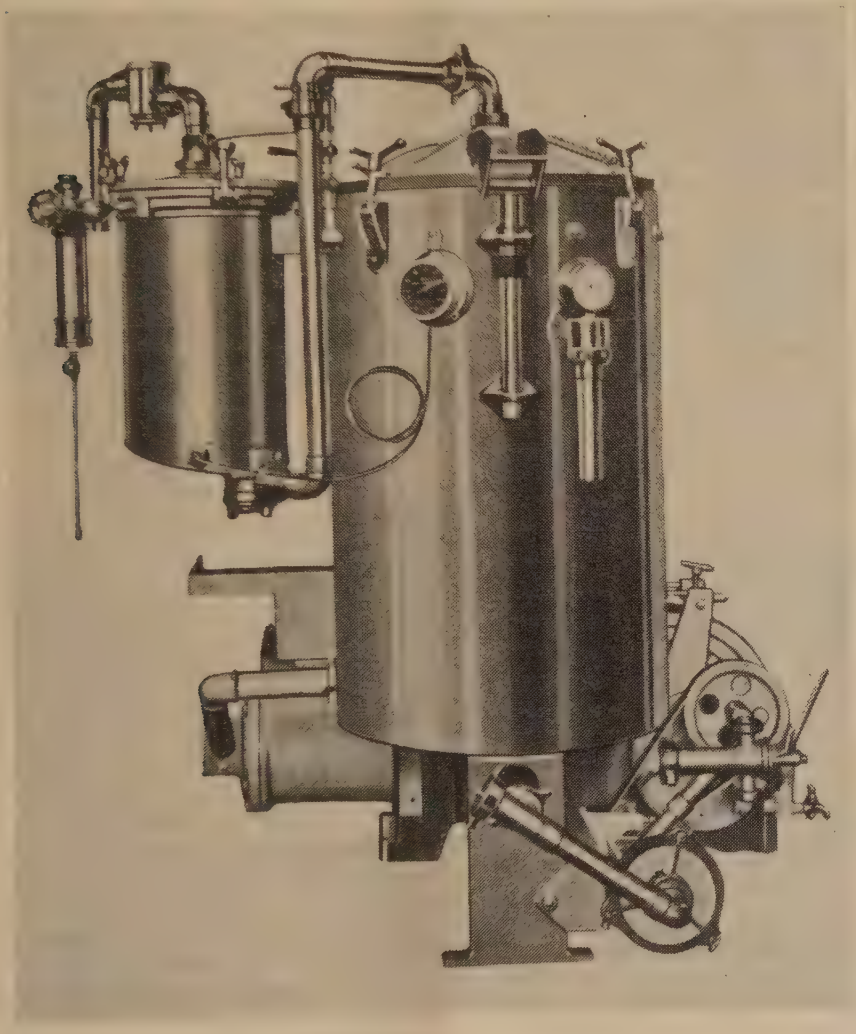


Plate 4.
"Bell" Pasteurising and Volatilising Unit.

Processing and Quality.

The relationship of processing and cream quality determines the grade score of the resultant butter. The degree of processing treatment necessary is obtained from experience of the various treatments given to creams of different quality and the grade score (quality) of the resultant butter. It is the aim of the factory to have all butter graded true-to-brand.

Wide variations in treatment can be applied with both the vacreator and cream treatment unit. The degree of treatment given to cream is referred

to as the intensity of treatment and is measured in terms of pounds of steam per gallon of cream treated. Steam consumption can vary from 1½ to 4½ lb. of steam per gallon of cream. Increased treatment is often obtained by the addition of extra series of chambers to existing machines.

With a good quality low-acid cream which is only slightly tainted, a low intensity of treatment is required. A poor quality, high-acid cream which contains marked off-flavours requires a high intensity of treatment. There are limits, however, to the effectiveness of high intensities of treatment, and if treatment is not adequate, butter will be degraded.

There are certain flavours in creams which cannot be removed by processing. This is a real problem in weed-infested areas of the State. Normal processing conditions intensify this objectionable flavour in butter. The only remedy for the problem is to ensure that the flavour does not find its way into the raw cream. Such measures as controlled grazing, mowing, hormone spraying and the establishment of improved pastures are positive farm measures to minimise the effect of weed taints. This defect caused 97,000 boxes of choice grade butter which represented 12 per cent. of all choice grade butter to be degraded in the 1955-56 season. In addition this taint was of more serious proportions in first and second grade butter. Other off-flavours such as oxidised, stale and chemical cannot be removed from cream by processing. Also where taints in cream are heavy only partial removal is possible. Cream of this type is not held in the machine for a sufficient time during processing to allow complete removal of these serious off-flavours.

The quality of butter is determined by a combination of judicious cream grading and blending together with an appropriate degree of processing.

Failure to process cream effectively results in down grading of the butter.

TABLE 1.

Processing Units in Use.

Type.	Year.		
	1943.	1950.	1957.
Flash	9	5	4
Volatiliser	13	11	1
Vacreator—Solo (1 leg)	9	7	3
Tandem (2 legs)	17	19	24
Triple (3 legs)	..	5	4
Triple (Stitcher)	..	..	6
Cream Treatment Unit—Medium (2 legs) ..	..	..	1
Large (3 legs)	..	..	1

Trends in Processing.

Since the introduction of the first vacreator to Queensland in 1934 (in the Kingston factory), there has been a progressive movement to intensify the degree of processing treatment given to cream. In 1955 the first cream treatment unit in Australia was installed in the Booval factory.

The extent to which these processing units have been improved can be seen in Table 1, listing the types of units in use in 1943, 1950 and 1957.

These improvements have required the expenditure of capital, the purchase and erection of complementary equipment, in some instances the alteration of existing factory layouts, and

TABLE 2.

PARTICULARS OF BUTTER GRADING.

Year.	Quantity Manufactured.	Quantity Graded.	Quantity graded choice.	Percentage graded as choice.
	(boxes).	(boxes).	(boxes).	
1950–51	1,897,871	1,509,169	595,973	39·5
1951–52*	1,114,020	689,699	237,116	34·4
1952–53	1,960,308	1,573,676	738,141	46·9
1953–54	1,671,908	1,262,992	376,440	29·8
1954–55	1,836,593	1,403,952	516,543	36·8
1955–56	1,927,562	1,521,744	581,430	38·2
1956–57	1,643,561	1,221,543	418,578	34·3

* Drought year.

the provision of additional boiler capacity for increased steam demands.

On the other hand, improved butter grade results have been achieved by some factories, and increased rates of treatment made possible.

Future Developments.

It must be realised that a limit could be reached where no benefit to quality would be gained by further intensifying the degree of processing. Under the desirable conditions of steam "washing" under vacuum, good flavours are removed with off-flavours. This produces a clean, flat-flavoured butter lacking in characteristic butter flavour. A butter of this type is not desirable for increasing consumer demand.

It is disturbing to note that the amount of choice grade butter produced in Queensland in the last seven years has remained relatively constant. The figures presented in Table 2 show the total butter manufactured, the quantity of butter submitted for grading and the amount graded as choice grade.

While there has been an improvement in the conditions of cream processing at the factory level, there has been no overall corresponding improvement in the amount of choice grade butter. It is this quantity of top quality butter which is important to the dairying industry.

This position emphasises the importance of the quality of the raw cream supply in relation to cream processing and butter quality. Intensive processing cannot overcome the defects of unclean methods of production and unsatisfactory cooling and storage of cream. Where this has been attempted it has met with only limited success. Through intensified processing, cream blending standards are often relaxed and the benefits of intensified processing are then being given to a minority of low quality suppliers and are not being shared by the industry as a whole. Further, degradings have occurred, which, in turn, have affected the suppliers at large and not the minority responsible for the supply of the poor quality raw cream.

There has been a progressive intensification of the degree of processing given to cream in Queensland butter factories during the past 20 years, and this recognition of the importance of adequate processing is most heartening. It is essential, however, that the role of processing in the production of butter be understood by both producer and manufacturer alike, and that intensive processing should not be employed as a "cure-all".

Rural Queensland Marches On

By R. V. RILEY, Division of Marketing.

Progress, a word that has influenced man from the beginning of time and encouraged him along the never-ending road of conquest over his environment, probably has just as much significance in the quickened tempo of today's living as it ever had.

But for the rural people progress means more than improvement relative to environment; it often means survival. For them there is the constant battle with pests and diseases and with the elements. Although areas under irrigation are increasing, most rural folk are utterly dependent on natural rainfall. Thus the bogey of recurring drought is a hazard of some proportion along the road of progress.

Farming and the tending of animals are still a way of life, but from the point of view of profitability the way has been considerably narrowed and there is an increasing necessity for the man on the land to become a business man and to manage his affairs in a business-like fashion.

For some there is the problem of soils wearing out, which necessitates some change in their traditional pattern of land use. For others who have tended stock without tilling the land there is the problem of putting some land under crop to provide fodder. Shortage of labour for rural tasks has led to mechanisation of rural practices. Machines have been improved and diversified to the extent that large capital outlay is required. Land values have increased and to get a satisfactory return from the size of the investment the people on the land have to face up to competitive overseas markets for surplus production.

TABLE 1.

STOCK NUMBERS IN QUEENSLAND AT MARCH 31.

(Source: Queensland Government Statistician.)

Year.	Horses.	Cattle.		Sheep.	Pigs.
		Beef.	Dairy.		
State Record	758,632 (1919)	6,900,000* (1894)	1,573,625 (1943)	25,650,231 (1943)	450,391 (1944)
3-Year Average— 1938–1940	445,131	4,697,842	1,471,057	23,282,490	333,200
1947	343,172	4,613,163	1,332,122	16,084,340	340,150
1948	335,581	4,592,896	1,382,564	16,742,629	378,102
1949	324,707	4,568,966	1,422,831	16,498,957	407,322
1950	317,261	4,872,018	1,432,760	17,582,152	391,836
1951	307,224	5,293,350	1,440,198	17,477,578	374,991
1952	288,606	5,137,715	1,296,659	16,163,518	316,529
1953	282,159	5,378,397	1,372,998	17,029,623	335,809
1954	273,180	5,702,999	1,383,208	18,193,988	384,453
1955	266,878	5,860,848	1,377,214	20,221,826	406,879
1956	261,092	5,946,282	1,383,739	22,115,746	372,871

* Estimated. The figure for total cattle in 1894 was 7,012,997.

With the foregoing as a background to our rural scene, let us examine what has occurred in rural industries in the past 10 years.

The gross value of Queensland's rural production in 1946-47 was £65,000,000, but in 1955-56 it had climbed to £211,000,000. Surely that is progress! But in the light of inflation and rising prices since World War II. it does not tell the whole story.

An attempt is made in this article to get back to the basis of our rural industries and approach the situation from the angle of stock populations and acreages under crop. True, the analysis makes no allowance for technological advances that have resulted in improved yields, improved quality and better control over pests and diseases, but it does give some indication of the progress that has been achieved.

LIVESTOCK.

In the pastoral industries the droughts of 1946-47 and 1951-52 caused some setbacks, but the overall effect of the seasonal conditions in the 10-year period under review has been favourable and cattle and sheep numbers have increased more or less steadily. Figures of annual stock populations are given in Table 1.

The advance of mechanisation in the town and in the country is reflected in the steadily decreasing number of horses. The extent to which the horse has been replaced by the machine on the farm can be gauged from the fact that the number of tractors on rural holdings increased from 17,792 at March 31, 1947 to 42,758 at March 31, 1956.

In the pastoral areas, except for the drought setbacks, beef cattle and sheep numbers have steadily increased in the 10-year period under review. In both cases the increase in stock numbers is the result mainly of favourable seasonal conditions, but for sheep some of the increase in later years can be attributed to the general buoyancy of the wool market and to improved control of pests, particularly blowflies.

However, if we look more critically at the picture presented by the figures in Table 1 for beef cattle and sheep we find that the improvement shown is merely the recovery from recurring droughts. The estimated beef cattle population at March 31, 1957, is 6,113,000, which is 787,000 below the estimated record population back in 1894, when the total cattle number for the State reached 7,012,997. This figure included dairy stock. No actual figure of dairy cattle at that time is available, but it would probably have been around the 100,000 mark.

With sheep the situation followed a somewhat similar pattern. At the end of 1892 there were 21,708,310 sheep. This figure declined to 7,213,985 at the end of 1902, rising again to 23,129,919 at the end of 1914. An immediate drop in numbers was then followed by a fairly steady increase up to the record 25,650,231 at March 31, 1943. For March 31, 1957, the estimated sheep population is 23,240,000.

Thus in the long term it would appear that, from the point of view of stock numbers, neither the beef cattle nor the sheep industry has progressed. Of course, as far as sheep are concerned technological advances have resulted in increasing yields of wool per head and this has offset to some extent the reduction in sheep numbers. In fact, it is expected that the 1956-57 wool clip in Queensland will be a record for the State, but from the point of view of annual yield of wool per head of sheep shorn, the figure will be loaded to some extent by the number of sheep that carried more than 12 months' wool because

they were not shorn in 1955-56 when the industry was beset by industrial troubles.

In recent years the attention of western people has been drawn to the idea of making provision for feeding their animals through periods of recurring drought. Many have been interested and some have taken action along the lines advocated in regard to fodder conservation. Advances have been made in the design of mechanical means to provide silage, baled fodder, etc., so that the rural folk will have an opportunity to do something about preparing for lean years. Again there is a complication in the situation in that a string of favourable seasons inspires confidence and tends to result in some overstocking which aggravates the feed position when scarcities arise.

The economics of whether or not to feed in a drought are beyond the scope of this article, as are questions of the availability of capital, but it would seem that the pastoral industries are entering an era in which they will have available the know-how and the machinery to cushion, if not minimise, the setbacks of a prolonged dry spell.

Dairy cattle numbers have shown a tendency to remain fairly steady. Probably the main reason for there being no steady increase despite increasing home population and a steadily rising demand for wholemilk lies in the fact that returns for surplus dairy produce sold overseas, mainly in the United Kingdom, have been unsatisfactory of late years.

Although it might have been expected that surplus butter production in Australia would be reduced by expanding population, there has been the compensating factor of the inroads made into the Australian market by the increasing production of table margarine. Approximately 5,700 tons of table margarine was produced in Australia in 1946-47. This in itself was about twice the pre-war figure, but by 1955-56 production of table margarine had risen to about 13,000 tons.

Whilst large numbers of Allied troops were stationed in the south-west Pacific area the demand for dairy products increased and stimulated dairy production to some extent. When this outlet for dairy produce was removed, the extra distance to the traditional market caused rises in distribution costs. This, together with increases in overseas freight charges, brought Australian dairy produce into stiff competition with European and subsidised home dairy products on the United Kingdom market.

For pigs the market is mainly local. Their numbers increased during the war years in response to the demand for food for armed forces, but again when this demand was removed their numbers dropped back and have remained relatively static.

Prices on the local market appear to have a strong influence on expansion and contraction in the pig industry. Further, it has been traditional to keeps pigs more or less as a sideline in conjunction with dairying. Whilst dairy cattle numbers have remained steady there has been an increased use of wholemilk for human consumption, with a corresponding decline in the supply of dairy by-products for pig feeding. This is another factor which has militated against expansion in the pig industry.

Possibly the most significant feature of the production side of the dairying industry has been the rapid increase in the use of milk as wholemilk, resulting in a corresponding decline in the quantity of butter produced relative to total milk produced. Figures of dairy production in Queensland are shown in Table 2.

The effect of the diversion to the wholemilk market can be seen to some extent when we compare the figures of butter produced against the total amount of milk produced for all purposes. If we regard the 3-year average as the base and call it 100, then the index figure for milk produced in 1955-56 is 90, whereas the index figure for butter produced in the same year has dropped to 79.

Calculations based on the figures in Table 2 show that in the three years to 1939-40 the average quantity of milk used for purposes other than butter and cheese was approximately 29,000,000 gallons. In 1955-56 the quantity of milk so used had increased to approximately 50,000,000 gallons. Figures of milk used for these other purposes in Queensland are not available for publication, but there are strong indications that a large proportion of the increase was consumed as wholemilk.

The population figures would have a direct bearing on the consumption of wholemilk. In Queensland the population increased from 1,097,303 at June 30, 1947, to 1,352,629 at June 30, 1956. It is interesting to note, too, that the Brisbane Milk Board in 1946-47 was responsible for the distribution of 10,929,807 gallons of pasteurised milk in the Brisbane Metropolitan area, whereas in 1955-56 the quantity was 16,700,916 gallons.

TABLE 2.

Dairy Production in Queensland.

Year.	Factory Butter Production (1).	Factory Cheese Production (2).	Total Milk Produced for All Purposes (3).
	Boxes.	Lb.	Gal.
State Record	2,756,657 (1938–39)	28,501,265 (1942–43)	347,336,000 (1938–39)
3-Year Average— 1937–38 to 1939–40	2,435,187	13,855,950	315,574,000
1946–47	1,322,714	17,316,208	207,465,000
1947–48	1,858,302	21,599,643	272,791,000
1948–49	1,887,886	21,031,242	277,152,000
1949–50	1,927,825	20,273,644	281,125,000
1950–51	1,897,773	19,429,065	278,111,000
1951–52	1,113,989	10,527,964	181,148,000
1952–53	1,960,232	21,169,505	285,533,000
1953–54	1,671,842	15,116,509	249,712,000
1954–55	1,836,582	17,743,787	275,605,000
1955–56	1,927,535	16,978,759	282,752,000

(1) Source: The Butter Marketing Board.
(2) Source: The Cheese Marketing Board.
(3) Source: Commonwealth Government Statistics.

AGRICULTURE.

Queensland farmers achieved a record in 1955-56 when they planted an all-time high acreage of crops. Just over 2,600,000 acres is a fairly extensive area and actually represents an increase of over 53 per cent. on the pre-war figure. But such is the vastness of our State that the 1955-56 planting is only a shade more than one half of 1 per cent. of the total area of Queensland.

The area of the State is 670,500 square miles, or 429,120,000 acres. For the year ended March 31, 1956, the total area of rural holdings was 367,464,259 acres, which includes all land used for pastoral purposes as

well as for crops. For the purpose of this analysis we will concentrate on land used for agricultural and horticultural purposes. The record created by farmers in 1955-56 was the planting of 2,600,134 acres, or about three-quarters of 1 per cent. of the area of rural holdings.

The division of areas planted into major crop classifications is set out in Table 3, which shows progress in the years 1946-47 to 1955-56 compared with the averages of the three pre-war years 1937-38 to 1939-40.

has been fostered by the improved pasture and fodder conservation programme now being pursued by the Department of Agriculture and Stock, which places emphasis on grazing the standing crop and conserving the surplus for the winter. In any case, there is evidence of increasing interest in the growing of fodder and hay crops.

Sugar Cane.

The area of sugar cane cut for crushing reached its peak in 1954-55 with 367,640 acres as a result of the

TABLE 3.

AREA UNDER CROP IN QUEENSLAND.

(Source : Queensland Government Statistician.)

Year.	Grain Crops.	Fodder and Hay.	Sugar Cane.*	Vegetables.†	Fruit Crops.‡	Other Crops.	Total.
	Ac.	Ac.	Ac.	Ac.	Ac.	Ac.	Ac.
3-Year Average— 1937–38 to 1939–40	615,018	546,749	253,053	56,072	34,713	187,350	1,692,955
1946–47	528,102	610,785	219,394	73,003	38,873	147,123	1,617,280
1947–48	771,106	582,949	215,378	68,631	41,752	168,723	1,848,539
1948–49	830,261	604,311	257,944	64,863	41,000	154,116	1,952,495
1949–50	888,303	636,919	272,812	64,790	39,121	154,973	2,056,918
1950–51	912,812	628,238	263,666	62,434	38,286	171,574	2,077,010
1951–52	820,258	647,498	273,370	63,143	37,868	179,064	2,021,201
1952–53	1,189,211	637,620	274,757	65,921	40,088	211,843	2,419,440
1953–54	989,565	732,054	332,703	58,879	42,863	202,063	2,358,127
1954–55	1,197,472	724,377	367,640	55,085	45,413	200,787	2,590,774
1955–56	1,149,546	751,921	365,252	57,071	44,169	232,175	2,600,134
10-Year Average	927,663	655,667	284,292	63,382	40,943	182,244	2,154,191

* Cut for crushing.
† For all purposes.
‡ Includes non-bearing acreage.

The most spectacular increase in area planted has occurred in the grain crops, but it may be better to analyse these in more detail at a later stage.

Fodder and Hay Crops.

These include lucerne, wheaten and other hay crops, as well as oats, wheat, lucerne and other fodder crops together with sugar cane cut for fodder. The acreage under these crops in 1955-56 is 37.5 per cent. higher than the pre-war average. The average for the 10 post-war years is 19.9 per cent. higher than the pre-war average. Possibly the 1946-47 and 1951-52 droughts gave the initial spur to many rural people to make some provision for lean years. The idea

expansion of milling facilities and the guaranteed market for specified sugar production. The area that may be planted to sugar cane in Queensland is controlled by the mill peak scheme and this tends to prevent violent fluctuations in the acreage planted from year to year.

Further expansion in the area of sugar cane in Queensland will probably be determined mainly by the availability of overseas markets for surplus production, and by increases in Australian consumption resulting from rising population figures. For the time being, efforts are being made within the industry to improve

efficiency by the introduction of more mechanisation into the field and of bulk handling of raw sugar at ports.

Vegetables.

The figure for acreage of vegetables includes the areas of pumpkins, turnips, sweet potatoes, mangolds and other vegetables grown for stock feed. In 1955-56 these fodder crops represented 18.9 per cent. of the total area of vegetables.

It is significant that the total area in 1955-56 was only about the same as the pre-war average despite the increase of population since World War II. Actually, vegetable production in Queensland reached its peak in 1945-46, when there were 89,723 acres planted in response to the demand created by the vast numbers of Allied troops stationed in the south-west Pacific area. Since that time vegetable production has declined, but the figures indicate that the industry generally has now more or less reached stability.

Fruit Crops.

This heading includes figures of areas which had been planted but had not yet reached the producing stage at the date of the annual census. In the 10 post-war years there was a decline from 1947-48 until 1951-52, followed by an increase from 1951-52 to 1954-55. The area for 1955-56 showed a slight decline but was still 27.2 per cent. above the pre-war average, whilst the average for the 10-year period showed an increase of 17.9 per cent. compared with the pre-war average. The main increases have occurred in the areas planted to apples, bananas and pineapples, whilst acreages of citrus and other fruit crops have remained relatively static.

Other Crops.

These figures include areas of peanuts, cotton, tobacco, navy beans, sunflowers, linseed and minor crops.

Tobacco acreage has shown a steady increase in the later post-war years and the industry now appears to be firmly established.

Cotton has generally declined but in the last few years has shown some signs of improving, although the figure of 13,290 acres for 1955-56 is 75.1 per cent. lower than the pre-war average of 53,458 acres. This is an industry which has always needed Commonwealth assistance; this has been afforded by means of relatively short-term agreements under the Cotton Bounty Act. Another limiting factor to expansion is the shortage of rural labour, which could be overcome by mechanisation, but growers generally are unwilling to make the investment of the large amount of capital necessary without the security of a long-term guarantee.

Beset by the problem of labour shortage, which for many crops has been alleviated by increased mechanisation and bulk handling methods or other devices, some crops barely exist as such these days. More particularly this refers to broom millet and arrowroot, crops for which no mechanical method of harvesting has so far been perfected.

The ginger crop is now only a shadow of what it had increased to by 1947 under the stimulus of the wartime shortage. After 1950, competition from the imported product was a problem. Slight tariff protection was afforded in 1952. Substantial protection was then given by a Tariff Board decision in May, 1955, which may be expected to assist recovery of the Queensland industry. However, the situation has been further aggravated by a serious shortage of seed ginger. To provide an adequate supply of locally grown seed, and in an endeavour to retain the market for ginger, the Ginger Growers' Co-operative has imported commercial ginger to be processed here.

Mainly as the result of adverse seasonal conditions the navy bean and peanut crops have declined somewhat. The demand in Australia for these crops at present far exceeds the supply, and the leeway is being made up by imports.

Under open market conditions the sunflower seed crop, which in the early post-war years showed prospects of expansion, has generally declined.

Linseed, under the stimulus of a guaranteed price, has shown spectacular progress. A further impetus was lent last year by the curtailment of the wheat acreage, but just how sensitive growers are to linseed prices is indicated by the fact that in 1953-54 in response to a reduction in price offered by millers the area dropped to 3,647 acres compared with 25,875 acres in the previous year.

Fluctuations in other individual crops have covered a wide range which is reflected to some extent in the totals. However, it is of interest to note that the average for the post-war 10-year period is slightly less than pre-war average despite the increases evident since 1951-52.

Grain Crops.

To get the picture of expansion in grain crop areas more clearly it is better to consider the respective crops individually. Set out in Table 4 are figures of acreage for the past 10 years compared with the pre-war average.

Wheat.—The area of wheat for grain shows the effects of drought in the years 1946-47 and 1951-52, but there is a picture of relatively steady increase from 1946-47 to 1952-53. This was followed by a decline up to 1955-56, but even at this stage the area planted was 48.3 per cent. above the pre-war average.

However, there is a vast change when the estimated area for the 1956-57 crop is taken into account. A combination of adverse weather at the normal planting time in 1956, together with the uncertainty of disposing of Australian pool wheat on the overseas market within a reasonable period, influenced growers in established wheat areas to swing to alternative crops which appeared to have more definite prospects. There was a pronounced swing to canary seed and linseed, and less so

TABLE 4.

AREA UNDER GRAIN CROPS IN QUEENSLAND.

(Source: Queensland Government Statistician.)

Year.	Wheat.	Maize.	Grain Sorghum.	Oats.	Panicum, Millet and Setaria.	Barley.	Canary Seed.	Total.
	Ac.	Ac.	Ac.	Ac.	Ac.	Ac.	Ac.	Ac.
3-Year Average— 1937–38 to 1939–40..	392,332	178,167	..*	9,318	..*	11,951	23,250	615,018
1946–47	247,996	141,487	68,775	15,433	39,372	9,099	5,940	528,102
1947–48	462,239	127,703	116,079	24,974	16,086	17,210	6,815	771,106
1948–49	607,750	97,598	48,011	21,278	14,103	27,674	13,847	830,261
1949–50	600,013	115,550	99,362	20,456	14,832	25,074	13,016	888,303
1950–51	558,780	112,467	166,311	16,998	20,225	26,099	11,932	912,812
1951–52	454,543	111,181	169,558	20,839	16,008	28,158	19,971	820,258
1952–53	724,495	108,230	190,619	56,403	16,461	71,879	21,124	1,189,211
1953–54	579,969	114,735	181,819	13,480	39,382	56,076	4,104	989,565
1954–55	687,402	114,673	202,532	36,432	45,842	87,297	23,294	1,197,472
1955–56	581,732	108,146	155,527	35,638	49,508	145,526	73,469	1,149,546
10-Year Average ..	550,492	115,177	139,859	26,193	27,182	49,409	19,351	927,663
1956–57†	390,000	107,000	160,000	30,000	40,000	150,000	100,000	977,000

* Only small amounts grown—individual figures not available.

† Estimates by Division of Marketing.

to barley, but estimates indicate that all these crops will show record acreages for 1956-57. At the same time the area of wheat declined to approximately the same level as the pre-war average, necessitating the import of wheat into Queensland from South Australia.

With wheat, which has been regarded more or less as a temperate climate crop, it is interesting to note that the pattern of geographical expansion of the acreage has taken it into more tropical latitudes. Wheat is now planted extensively in the Burnett, Dawson-Callide and Central Queensland Highlands districts.

Barley.—Here is a crop which has found its way to overseas markets in the last few years and has apparently been able to hold its own in the atmosphere of the swing from the sellers' to the buyers' market.

Steady, but slow, expansion occurred in the earlier post-war years, but from 1952-53 onwards the situation became dynamic. The first year of the period under review was a drought year and produced little more than was required for seed for the succeeding year, but from then onwards expansion took place. The increased acreages from 1952-53 to 1955-56 lifted the post-war average to more than four times the pre-war figure, whilst the estimated area for 1956-57 is expected to show a further slight increase on 1955-56.

Maize.—In this crop there has been a pronounced downward trend compared with the pre-war average, though in later years the acreage appears to have settled down to a figure of approximately 110,000 acres, which is 38.3 per cent. below the pre-war average. Probably one of the main reasons for this decline is the replacement of the farm horse by the tractor and the virtual disappearance of the horse from commercial transportation, thus contracting the local market for maize as a stock food.

Grain Sorghum.—This is a crop that was of little importance before World War II. The quantities grown were so small that the figures were not collected separately. Following the introduction of dwarf varieties which were suitable for mechanical harvesting by the same machines that handled wheat, barley and oats, there was a period of steady expansion in the post-war years until the peak of 202,532 acres was reached in 1954-55. The hardening of the overseas market made itself felt among sorghum growers, with the result that in the past two years the acreage planted has shown evidence of substantial contraction.

Oats.—In Queensland, oats are grown primarily for grazing and fodder purposes and the area that goes under the harvester is largely determined by seasonal conditions. When these are good and other fodder supplies are abundant the acreage of oats that is allowed to go to grain is likely to be much higher than when seasonal conditions are poor. This is one of the main reasons for the fluctuations in the annual acreages of oats for grain. However, on the whole, the post-war trend has been upwards, with the result that the average for the 10 years 1946-47 to 1955-56 is almost three times the pre-war average.

Panicum, Millet and Setaria.—These are small grains used mainly for the feeding of cage birds, although in some eastern countries they are used for human consumption on a small scale. Figures for the three crops are collected as a total and no information is available as to movement in individual crops. Pre-war the acreage was so small that it did not warrant separate tabulation.

There have been considerable fluctuations in the area cropped from year to year, but the phenomenal expansion in the hobby of keeping cage birds in the United Kingdom

and on the Continent of Europe has provided a market for grain surplus to home requirements in the last few years. This is reflected in the substantially increased areas from 1953-54 on.

Canary Seed.—As its name implies, this is another small seed that is a foodstuff for cage birds. In the post-war years the area planted has been subject to rather violent fluctuations which make it difficult to compare with pre-war average. In the last two years of the period under review the acreage expanded out of all proportion to preceding annual figures, mainly as the result of a market becoming available overseas as it did for panicum, millet and setaria. When wheat plantings were restricted in 1956 wheat growers chose canary seed as one of the available alternatives, so the acreage for the 1956-57 crop is expected to be a record. Despite the high acreage in 1955-56, the average for the 10 post-war years is 16.8 per cent. lower than the pre war average.

Total Area of Grain Crops.—As will be seen from Table 4, the area of wheat planted exerts the greatest influence on the total acreage of grain crops. Therefore, when the wheat area declined there was a corresponding decline in total area of grain crops, offset slightly in 1955-56 by the increased acreages of barley and canary seed. This effect is also pronounced in the estimates for 1956-57, although the total in itself is 58.9 per cent. higher than the post-war average.

Prospects of Further Expansion.

If we go back to 1920-21, a period of 36 years, it is possible statistically to determine a long-term trend of steady expansion. In this long-term trend we find that the relatively static period of the six years of World War II. is balanced by the increased rate of agricultural expansion in the post-war years. In fact, although the period since 1945-46 is rather too short to establish a reliable trend, it would seem that a new trend began at the end of the war.

Between the wars, drought years, except 1926-27, appear to have had little effect on the steady increase in areas planted. However, since World War II. the effect of the 1946-47 and 1951-52 droughts are more clearly defined. This is probably a feature of "the larger the area planted, the bigger the bump when the rain fails." It is also a fact that much of the recent expansion has been into areas of lighter and less reliable rainfall, such as the Central Queensland Highlands.

Some of the problems that lay in the way of putting more land under crop, and which in earlier years seemed almost insurmountable — brigalow scrub and wallum country, to mention but two—are receiving the attention of scientists. Machinery for land clearing and soil preparation is becoming bigger and better and able to cover larger areas of land in shorter time than formerly, whilst methods of water and soil conservation are being improved and are being accepted by more farmers as each year passes.

World population and the demand for food are still increasing, and subject to the vagaries of the market, the availability of capital and possible limitations bound up with questions of land tenure, it might be expected that agricultural expansion could proceed at the same rate as it has in the past 10 years.

HAY BALE STRAIGHTENING DEVICE ASSISTS LOADING.

A novel attachment which ensures that bales of hay dropped from a pick-up baler will be left in orderly rows on the ground has been developed by the C.S.I.R.O. Plant Fibre Section. The bales do not then require straightening by hand preparatory to mechanical loading.

It is intended primarily for use on balers that carry the knife on the top rather than at the side. When used with such machines the device leaves the bales so that the cut edge of the bale is vertical. This, it is believed, ensures that moisture pick-up from the ground and penetration of rain are minimised.

The operation of the straightening attachment is as follows. The bale moves along an extended chute, remaining in its normal position until just before it leaves the baler chute proper. At this moment one end of the bale is held firmly by the baler, whilst the other is twisted around by a turning arm which is part of the attachment.

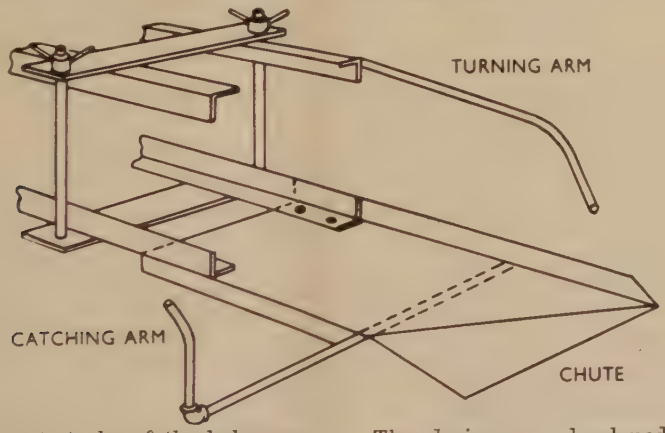
Then, as the baler moves forward, the bale slides off the arm and comes to rest on the ground.

The unit consists essentially of three simple parts:—

A chute about the same length as the average bale.—The off-side edge of this extension chute should be turned up to provide a guide. The near-side edge, however, must be turned down or cut off. Finally, the near-end corner of the chute should be bent (see sketch) to ensure that the bale starts to turn at the rear towards the near side.

A turning arm made of ½-in. water-pipe or light angle-iron.—The arm is fastened to the upper off-side member of the baler chute and slopes towards the rear. It is bent at its outer end to ensure that the bale moves out to the bent-down portion of the chute.

A catching arm of 1-in. or 1½-in. water-pipe with a right-angle bend.—The arm is placed on the extended chute so that the front end of the bale lands on the horizontal arm as the bale turns.



On the next stroke of the baler arm the bale starts to turn at the end of the chute extension, and begins to slide down the turned-down corner of the chute.

The bale continues to slide until its bottom corner touches the ground. At the same time the bale keeps on turning until the rear end rests on the ground and the front end on the catching arm of the attachment.

The device was developed by Mr. J. H. McClelland of the Plant Fibre Section and is the subject of a C.S.I.R.O. patent application. Any farmer who wants to make the unit for his own use may obtain a more detailed guide from the Officer-in-Charge, C.S.I.R.O. Plant Fibre Section, Graham Road, Highett, S. 21, Victoria.

GROUP SCHEMES BOOST SOIL CONSERVATION.

The necessity for group organisation in meeting Queensland's soil conservation needs was outlined recently by the Minister for Agriculture and Stock (Hon. O. O. Madsen, M.L.A.).

Soil erosion, he pointed out, does not respect property boundaries, and experience in Queensland has shown clearly that co-ordinated action through group schemes is the sound approach to the erosion problem. It permits co-operative action between farmers and, at the same time, ensures the overall planning of measures for run-off water control on both farms and roads.

Action on an individual farm basis is not the most effective approach and does not make the best use of the Department's technical services. The group movement creates interest in soil conservation throughout the whole catchment and ensures that planting, surveying and construction can be carried out at minimum cost.

The group approach to soil conservation is being tested in the South Burnett in two catchments totalling 12,000 acres and embracing 50 farms. Here, the number of farmers applying conservation measures has increased from four to 31 in the last few years. On these two catchments 1,400 acres of contour banks and 1,800 chains of waterways have been constructed.

In one scheme, the 4,000-acre Wooroolin Swamp catchment, only two of 21 farmers were applying conservation measures in January, 1952. Following a farmers' meeting, the Department prepared a complete soil conservation plan for the whole catchment. The farmers then knew exactly where they were going. As a result, 14 of them are now applying conservation measures and have built 800 chains of waterways and installed 500 acres of contour banks.

The plan for the second scheme, the 8,000-acre Memerambi catchment, was completed in 1954. Now 17 out of 29 farmers in the area are applying conservation measures. Contour banks have been installed on 900 acres and 1,000 chains of waterways have been constructed.

In these groups, each farmer finances and carries out his own section of the scheme. The work is done either with machinery already on the farm or by contract.

GROWTH HORMONES FOR CATTLE.

The merits of treating young beef cattle with growth-stimulating hormones are being investigated under Queensland conditions, the Minister for Agriculture and Stock (Hon. O. O. Madsen, M.L.A.) said recently.

Trials are in progress at the Bureau of Tropical Agriculture, South Johnstone, to examine the effect of the hormone stilbestrol on steers grazing on improved tropical pastures.

Recent reports from Britain and the United States show a significant response to the use of stilbestrol on pasture-fed steers. Treated steers showed weight gains of up to ½ lb. a day more than untreated ones.

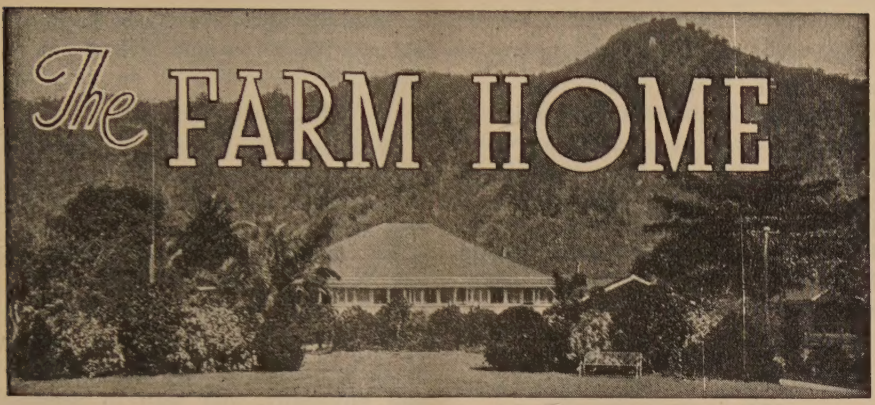
In the Queensland trials, a small quantity of the drug is implanted under the skin of the ear by means of a special implanter.

It is known that treated animals eat more food than untreated ones, but the amount of food required for 100 lb. gain is greatly reduced. In all overseas trials where cattle have responded to hormone treatment, pastures have been good enough for untreated animals to gain at least 1 lb. a day.

There is no evidence to suggest that hormone treatment is of any value when animals are not receiving such good feed. On the contrary, treatment may be harmful if the animals are not well fed.

Mr. Madsen said that the Queensland trials are intended to find out whether hormone treatment has a place in the beef industry in this State.

"We want to find out whether we can make cattle grow even faster when they're on feed that will permit good weight gains anyway," he said. "Treatment may, for instance, be of value in cattle on native pastures during the flush season, or in cattle grazed on improved pastures, irrigated pastures or a crop."



Care of the Elderly

Given enough years of living, we shall all know what it is to be old.

Shall we, by our understanding and consideration of old folk to-day, have earned for ourselves the right to a happy to-morrow?

For the sake of both yourself and the elderly person who, now or in the future, may be in your care, the Queensland Health Education Council offers this carefully prepared advice.

PHYSICAL CARE.

The physical needs of old people are usually not great, and the best general guide is moderation in all things. However, we must not go to the other extreme and under-estimate the things needed to keep the elderly person fit and well. Here are the main points.

Food.

Old people are inclined either to over-eat (frequently through lack of other interests) or to subsist so meagrely that they are under-nourished. Too many are apt to confine themselves to a diet of tea and bread and butter.

Old people, as well as younger folk, need a varied diet, including a little of each of the good foods. It is better for meals to be small and fairly frequent than bulky and taken at long intervals. It must be remembered that over-eating means overweight, one of the greatest dangers to health in old age! Drinking plenty of water will help to avoid the cramps of old age.

Clothing.

Old people need to be well wrapped in cold weather, so they are not tempted to rely for warmth on stuffy rooms. Being dressed in outdoor garments, rather than gowns and slippers, will encourage them to seek the fresh air and mild exercise.

Activity.

Moderate activity is far better for old folk than inertia. Performing small household tasks and taking walks will help provide healthy exercise and a wholesome mental attitude. However, the elderly person must never try to repeat the physical feats of his younger days. Especially to be guarded against is hurry, which imposes dangerous strain on the heart and circulatory system. Moderate activity in old age is good, provided a calm, unhurried attitude is cultivated.

Rest.

Sometimes old people worry unnecessarily about the fact that they don't sleep as much at night as they once did. This is quite normal, and to be expected, especially if they follow the wise habit of having a daily doze after lunch. As a general rule, old people should have small rests frequently.

Safety.

We must remember that old people don't see and hear so well as the young, and their muscular reactions are slower. All furniture, rugs and household equipment should be examined with an eye to accident prevention, especially the prevention of falls. Stairs should be well-lit and have hand-rails. Safety in the bath for old folk demands hand-rails and a rubber mat.

Warning Signs.

In the care of old people, keen observation is needed. Tell the doctor without delay about any sudden change of condition. It is especially important to report a persistent cough, sudden loss or gain in weight, bleeding from any part of the body, spells of dizziness, vision disturbance or a thickness of speech.

MENTAL CARE.

It cannot be too strongly emphasised that the old person is not a machine, to be satisfied by mere physical maintenance. There are probably many more old folk made unhappy through mental than through physical causes.

Attitude of Aged.

Much depends on the attitude of the old person himself. If there is a secret of "How to be happy though old," it lies in having a purpose in life. This calls for a positive outlook by the old person. The way to look at retirement is to retire not "from" something, but "to" something. It should be seen as a release from the worries and business of money-making; a new freedom to follow a bent, to do things so long dreamed of "when I have time."

There are some old people full of enthusiasms, always finding something fresh and interesting, especially in the way of helping others. They enjoy life. Yet often their contemporaries, sometimes as much as ten years younger, simply sit around waiting for the end! In idleness there is nothing but decay. But, however restricted physically, the old person need never be mentally idle. We can be happy in old age if we continue to look out on the world rather than in on ourselves.

Attitude to Aged.

We must never forget that old people need desperately a sense of belonging and usefulness. As much as possible, they should be allowed to help in small ways, and made to feel that their help is appreciated.

Old people should be encouraged to make contact with the outside world. It will help them to keep alert mentally and physically, and help to prevent boredom. We should remember that for old people it is a "day of small things," all of which help to keep life interesting. In case of forced inactivity, the radio can be a boon.

Privacy and personal belongings are very precious to old people. A room of their own, with some family possessions about them, can give them a much-needed sense of security. They should be encouraged to have their own friends, and allowed to make some decisions regarding such things as their clothes. This will help them from feeling completely dependent.

Creative Activity.

It is a big help to old people to realise the great things that have been achieved in old age, proving that interest and activity can keep people always young, in a creative sense. Michelangelo was still producing masterpieces at 89. Goethe finished "Faust" when 81, and Tennyson wrote "Crossing the Bar" when 83. Toscanini, Churchill and many others have proved equally well how much truth there can be in the old saying, "You're only as old as you feel!"

Growing Old Gracefully.

With the understanding help of those who care for them, old people can reap the rich rewards of experience and wisdom accumulated in life. They can enjoy a life whose tempo is unruffled by the hustle and bustle of the business world and the fever of competition. Something of youth always remains in new experiences and new achievements.

The Danger of Tetanus

PREPARED BY THE QUEENSLAND HEALTH EDUCATION COUNCIL.

Tetanus is easy to prevent, but difficult, and often impossible, to cure. About 50 per cent. of notified cases who develop symptoms die from the disease, in spite of medical treatment.

Tetanus is an acute fever, caused by the tetanus bacillus, a tiny but very dangerous germ which produces a deadly nerve toxin when it grows in deep wounds, away from sun and air. Tetanus is often called "lockjaw" because one of the commonest symptoms of the disease is a painful spasm of the jaw muscles.

How Tetanus is Contracted.

The germ which causes tetanus lives in the intestines of grass-eating animals, particularly horses, and is most likely to be found in and around farmyards, stables and gardens where the soil is treated with animal manure. The germ is extremely hardy, and can live for years in the dust. There is a risk from tetanus in almost any paddock, garden, footpath or road. Tetanus can be picked up nearly anywhere, particularly by children who play barefooted.

How Tetanus Develops.

The tetanus germ prefers a deep, punctured wound with a small opening. Such a punctured wound shuts out oxygen and enables the tetanus germs to thrive and increase in their dark, moist hiding place. A deep cut or puncture caused by stepping on a nail or the prong of a fork is much more likely to be followed by tetanus than a surface scratch. Gunshot and fireworks accidents are especially dangerous, because the force of the explosion can carry the infected material deep into the tissues.

Symptoms.

When a wound is neglected, tetanus takes anything from 4 to 21 days to develop. Stiffness of the neck muscles, and painful spasms of the jaw muscles, causing difficulty in swallowing, are often the earliest symptoms. Later on, spasms of the other muscles of the body occur. Often the slightest noise or jarring is sufficient to throw the patient into violent and agonising convulsions. The quicker the symptoms occur, the greater the danger.

The Danger is Real.

Once the symptoms of tetanus have developed, it becomes a very serious disease. In Queensland, between 1945 and 1949, there were notified 160 cases of tetanus with a death total of 89—slightly over half. Probably the figures would be much higher but for the fact that most doctors take the precaution of giving an anti-tetanus injection to all accident victims if there is any risk that dirt has entered the wound.

Danger to Children.

Children are in a danger group. Queensland statistics over the past five years reveal that 36 per cent. of all deaths from tetanus occurred in children under the age of 15 years. This age group comprises only 28 per cent. of the population.

Immunisation.

There need be no deaths from tetanus. Anti-tetanus immunisation will safeguard you against this killer. Two or three injections of anti-tetanus toxoid, followed by another dose one year later, and repeated single doses about every five years, are all that is required.

Anti-tetanus immunisation is particularly important for people living in rural areas, or engaged in occupations where there is a special risk of tetanus. Children can—and should—be immunised at 18 months of age.

Save your children and yourself from the death that lurks in dirt. See your doctor or Local Council to-day about anti-tetanus immunisation.

Precautions against Tetanus.

If you have not protected yourself by anti-tetanus immunisation, observe these precautions:—

(1) Do not try to close a deep, punctured wound, or think it is unimportant because it is small and appears healthy. Punctured or torn wounds, especially those which are dirty, or have bits of contaminated matter forced into them, require immediate medical attention.

(2) If there is even a remote possibility that you have been infected by the tetanus germ, make it your business to get an injection of anti-tetanus serum. This should be done as a precautionary measure even when immunisation has been given previously. Most probably your doctor will suggest it; if he does not, be sure to ask whether or not he thinks it necessary.

(3) If any of the symptoms of tetanus develop, do not waste a moment in getting medical attention. Large doses of anti-tetanus serum may save your life. Even a few hours' delay can make all the difference.

AN UNUSUAL FINDING OF A WILD DUCK BAND.

Since the banding of wild ducks was commenced in Queensland, a number of bands with relevant information have been returned by shooters and others to the Department of Agriculture and Stock, the authority responsible for the project.

The finding of band No. 37, which was placed on the leg of an adult female maned goose (wood duck) at Beenleigh on February 21, 1957, must certainly be regarded as unusual.

About July 23, 1957, a 25 lb. Teraglin, which is a "blue-water" species of fish, was caught off Wooli, via South Grafton, N.S.W. When cleaning the fish, Mr. R. Boulton of Wooli found band No. 37 in its stomach.

C. Roff, Fauna Officer.

Members of a Beekeeping School Conducted by the Department of Agriculture and Stock Visit a Moreton District Apiary.